# MYCOLOGIA

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## ILLUSTRATIONS OF FUNGI—XXI

WILLIAM A. MURRILL

Figures 3 and 4 on the accompanying plate were drawn from specimens collected by the author at Stockbridge, Massachusetts, with the aid of Dr. W. Gilman Thompson. The other specimens used were collected in or near Bronx Park, New York City.

**Panaeolus solidipes** Peck

SOLID-STEMMED PANAEOLUS

Plate 160. Figure 1. × 1

Pileus firm, at first hemispheric, then subcampanulate or convex, 5–7 cm. broad; surface smooth, whitish, the cuticle at length breaking up into dingy-yellowish, rather large, angular scales; lamellae broad, slightly attached, whitish, becoming black; spores broadly ellipsoid, very black with a bluish tint, 17.5 × 10 μ; stipe firm, smooth, white, slightly striate at the apex, solid, 12–17.5 cm. long, 4–8 mm. thick.

This species, which is unusually large for the genus, occurs rarely in manure heaps or in heavily manured ground in the eastern United States. According to Peck's original description and figure, the surface becomes distinctly scaly with age. The specimens here figured, found in the New York Botanical Garden, were probably collected before this character had developed.

[MYCOLOGIA for May, 1915 (7: 115–162), was issued June 15, 1915.]

**Lactaria plinthogala** (Otto) Burl.

SOOTY LACTARIA

Plate 160. Figure 2. × 1

Pileus fleshy, convex to plane, sometimes with a small umbo, depressed in the center, then subinfundibuliform, 2–6.5 cm. broad; surface raw-umber to dingy-yellow-brown, snuff-brown, or putty-colored to pallid, usually darker in the center and at first, then fading, dry, glabrous but covered with a bloom, usually very smooth, sometimes wrinkled in the center when mature; margin entire or wavy; context white, changing to reddish or salmon where exposed to the air; latex white, tardily acrid, rarely changing color except when in contact with the broken flesh, where it becomes salmon-pink; lamellae nearly white at first, then maize-yellow, becoming pinkish or salmon where wounded, pruinose, sometimes forking near the stipe and sometimes connected with vein-like reticulations, subdistant, adnate or slightly decurrent, about 5 mm. broad; spores yellow, mostly globose, echinulate, 6.5–10 $\mu$ in diameter; stipe of the same color as the pileus, often whitish at the base, nearly equal or tapering downward, glabrous, pruinose, stuffed but firm, then hollow, 5–7 cm. long, 6–12 mm. thick.

This species is widely distributed in the eastern United States in deciduous or mixed woods. Certain closely related forms are sometimes difficult to distinguish, but they all appear to be regarded as edible.

**Cortinellus decorus** (Fries) P. Karst.

ORNAMENTED CORTINELLUS

Plate 160. Figure 3. × 1

Pileus thin, rather tough, convex becoming plane or slightly depressed, subexpanded, 4–7 cm. or more broad; surface moist, melleous, sometimes tinged with flavous, fuliginous at the center, dotted with minute, brownish or blackish, hairy squamules, margin incurved; context yellow, watery, mild, insipid, with unpleasant odor; lamellae adnate to slightly sinuate, crowded, arcuate, cremeous-flavous; spores subglobose, smooth, hyaline, 5–6 × 4–5 $\mu$; stipe equal, often curved, stuffed or hollow, melleous, fibrillose or squamulose, especially above, rarely glabrous, sometimes eccentric, 2.5–6 cm. long, 4–6 mm. thick.

This pretty wood-loving species is not often seen, although it is widely distributed in temperate North America and Europe on decaying coniferous trunks. Peck's *Tricholoma multipunctum* is not distinct. The specimens here figured are unusually small.

**Melanoleuca fumidella** (Peck) Murrill

SOMEWHAT CLOUDED MELANOLEUCA

Plate 160. Figure 4. × 1

Pileus convex, then expanded, subumbonate, 2.5–5 cm. broad; surface smooth, moist, at times rimose-areolate, dingy-white or clay-color clouded with rose or brown, becoming paler when dried, the disk darker than the margin; context white, with distinctly farinaceous taste and odor; lamellae white, sinuate, broad, subventricose, not crowded; spores 4.5 × 3.5 μ; stipe equal, smooth, solid, splitting readily, whitish or pale-pinkish, 5–7.5 cm. long, 4–6 mm. thick.

This species is found rather frequently on the ground in woods from New England to North Carolina. The genus is exceedingly large and difficult.

**Lactaria Volkertii** sp. nov.

Plate 160. Figure 5. × 1

VOLKERT'S LACTARIA

Pileus hemispheric to convex, becoming rather deeply depressed at the center, solitary, reaching 7 cm. broad; surface dry, exactly fulvous, finely tomentose, the pellicle slightly separable toward the margin, which is somewhat concentrically zonate in mature plants; context very firm, white, mild in taste, with an odor suggestive of *Russula foetens*, but changing in drying; lamellae crowded, adnate, arcuate, some of them forked, showing no colored latex, but becoming brown when bruised as in species of *Lactaria* containing watery latex; spores globose to subglobose, rough, hyaline, 8–11 μ; stipe cylindric, equal, milk-white throughout, becoming brown when bruised, very solid and firm, reaching 5.5 cm. long and 2 cm. thick.

Type collected in moist ground in deciduous woods near Bronx Park, New York City, August 6, 1911, *W. A. Murrill & E. C. Volkert*. This beautiful species, which has been collected but once, has every mark of a *Lactaria* except the milky juice. The change

in color of the lamellae, however, is taken to indicate that the latex was scarce and watery. Miss Burlingham suggests that the dried specimens greatly resemble *L. lactiflua* in appearance and odor. I have never seen a specimen of *L. lactiflua* with the colors and surface characters of this plant nor without an abundance of latex in the younger stages. Miss Burlingham says that it does not resemble any species of *Russula*.

**Ceriomyces retipes** (Berk. & Curt.) Murrill

NETTED-STEMMED CERIOMYCES

Plate 160. Figure 7. × 1

Pileus convex above, concave or plane beneath, rarely cespitose, 5–12 cm. broad, 1–2 cm. thick; surface dry, opaque, somewhat viscid when wet, minutely tomentose to glabrous, sometimes covered with a yellow pulverulence, varying in color from yellow or yellowish-brown to fuliginous; context firm, light- to deep-yellow, unchanging, mild or slightly bitter; tubes adnate, slightly decurrent, somewhat depressed with age, 1 cm. or more long, clear lemon-yellow when young, becoming dull-yellow at maturity, darker with age, but not changing when wounded, mouths circular to angular, less than 1 mm. broad, slightly flesh-colored when bruised; spores oblong, smooth, yellowish-brown, 11–14 × 3–4.5 $\mu$; stipe subequal, often bulbous at the base, distinctly and beautifullly reticulate, sometimes entirely to the base, yellowish-pulverulent in some specimens, yellow and firm within, yellow or yellowish-brown without, 5–12 cm. long, 0.5–2 cm. thick.

An attractive and well-marked edible species occurring commonly in thin woods from Nova Scotia to Alabama and west to Wisconsin. The cap varies in color from yellow to brown, the flesh and tubes are yellow, and the yellow stem is beautifully reticulated to the base. It was first described by Berkeley from plants collected by Curtis in North Carolina, and later Peck assigned the name *B. ornatipes* to a dark form of the same plant. Pecks' *B. griseus* is closely related but is gray with white tubes.

**Scleroderma**

SPECKLED PUFFBALL

Plate 160. Figure 8. × 1

This pretty little puffball is not uncommon in the eastern United States on the ground in thickets and open woods. It differs from the common hard-skinned puffball externally in being much smaller and paler in color and having a much thinner, flexible peridium. It has been called *Scleroderma tenerum* by some, but whether *S. tenerum* Berk. & Curt. described from Cuba is meant or not, I do not know.

**Russula pectinatoides** Peck

SLIGHTLY PECTINATE RUSSULA

Plate 160. Figure 9. × 1

Pileus thin, broadly convex, becoming nearly plane or centrally depressed, 2.5–7.5 cm. broad; surface chamois-colored to dingy-straw-colored or yellowish-brown to cinnamon-brown, darker in the center, viscid when moist, glabrous; margin widely tuberculate-striate; context grayish-white under the separable pellicle, otherwise white, mild or slightly and tardily acrid; lamellae white, becoming creamy, fulvous where bruised, mostly equal, some forking next to the stipe, adnate, thin; spores whitish, subglobose, 6–8 $\mu$ in diameter; stipe white, discoloring yellowish-brown where bruised or in drying, glabrous, spongy within, 2.5–5 cm. long, 5–10 mm. thick.

This species occurs in grassy ground in groves and woods from New England to Michigan and southward as far as North Carolina. The specimens figured represent the minimum size.

NEW YORK BOTANICAL GARDEN.

# UREDINALES OF PORTO RICO BASED ON COLLECTIONS BY F. L. STEVENS

J. C. Arthur

The material illustrating the rust flora of Porto Rico, which was collected by Dr. F. L. Stevens and placed in my hands for study, represents a specially valuable contribution to the knowledge of tropical fungi. There were 650 numbers of the material submitted, which were mostly collected during the year 1913, only some twenty-three having been secured during the year 1912 and seven during January, 1914.

This is an especially notable achievement, as all other collections of rusts from the island taken together only slightly exceed 100. These range mostly through the last sixteen years. Among the previous collectors the two having the greatest knowledge of the *Uredinales* are Prof. E. W. D. Holway, leading with 25 collections made in January and February, 1911, and Dr. G. P. Clinton, following with 21 collections made in April, 1904. Some rusts have been included in collections made during the last few years by the botanists at the Experiment Station of the Porto Rico Sugar Growers' Association, about twenty-five of which have come to my attention.

Until the Stevens' material was available the general impression of the rust flora of Porto Rico has been that it was scanty and lacking in interest. Professor Holway, who is famous as a collector of microfungi, wrote from San Juan on January 29, 1911: "I have just come in from our trip across and around the island; rusts are very scarce." Again in a letter from Minneapolis, Minn., dated March 21, 1911, he writes: "I am just home from Porto Rico; I will send you the specimens soon. There are not many, but more than Sintenis got in his three years there." It now appears from the work of Dr. Stevens, however, that there are plenty of species in the island and some of exceptional interest, although the rust flora is not generally as conspicuous as is usual in temperate regions.

The 650 collections distribute themselves under 109 species of rusts, giving an average of about 6 collections to each species. Actual duplicates in the set are few, however. The several numbers under each species are often required for additional hosts, over 170 species altogether being represented, many not heretofore recorded as such, for illustrating successive stages of the fungus, some before unknown, and for distribution, over 65 localities having been visited.

The species previously known from Porto Rico do not exceed thirty-five in number, or about one third of the number secured by Dr. Stevens. The richness of Dr. Stevens' set is also attested by showing thirty-nine species, or over one third of his collection, as additions to the previously known rust flora of North America, of which number eighteen are new to science.

The family *Coleosporiaceae* is represented in Porto Rico by three species, of which *Coleosporium Plumierae* is distinctly West Indian. It is not, however, certain that this species is entirely autonomous, it may well be only a race of some earlier described species of wide range. Only cultures will fully elucidate this point. It is significant that no member of the genus *Pinus* occurs in Porto Rico. So far as known the species of *Coleosporium* form their aecia only on leaves of pines. It is practically certain that the three species in Porto Rico maintain themselves by the uredinial repeating spores, and are not indigenous to the island.

The family *Uredinaceae,* often called *Melampsoraceae,* is somewhat better represented. Five species are listed here. Two of these (under *Kuehneola*) have heretofore been invariably placed with the next family. The shift is made on account of the catenulate teliospores, in contradistinction to simple teliospores with one or more cells, and the resemblance of the uredinial sorus to that of *Pucciniastrum* in the manner of spore formation. The species of the family are like those of the preceding family in maintaining themselves by the uredinial repeating spores, only one, *Cerotelium Canavaliae,* being known to produce telia in the West Indies, and for none of them is the aecial condition known. There are five other forms listed under the form-genus

*Uredo,* which doubtless belong in this family. One of these forms, *Uredo fenestrala,* possesses a peridium having elongated cells at the sides and isiodiametric cells above, as in the genera *Schroeteriaster* and *Hyalopsora.* The other four forms, Nos. 105, 106, 107 and 108, have a pseudoperidium formed of imbricated paraphyses, which indicates a position near *Kuehneola* and *Physopella.* Possibly the fern rust, *Uredo Gymnogrammes,* also belongs near these forms. If all these were to be counted in, we would have eleven species under the family *Uredinaceae.*

The family *Aecidiaceae* (*Pucciniaceae*) contains the chief part of the Porto Rican rusts. There are sixty-three species so assigned in the following enumeration, of which one, *Pucciniosira pallidula,* is usually placed under the *Uredinaceae,* but is here shifted to the *Aecidiaceae* on account of the structure of the sorus. To these sixty-three should be added the species under the form-genus *Aecidium,* and such of those under *Uredo* as have not just been assigned to the other families, or eighty-five species in all. It is probable, however, that some of the species under the two form-genera merely represent stages of species already named under *Uromyces* or *Puccinia.* It almost amounts to a certainty that the ten species of *Aecidium* represent aecial forms to be distributed among the fifteen grass and sedge rusts enumerated, or those yet to be found. It is doubtless safe to assume, that omitting the names eventually to be reduced to synonymy, we ought to have remaining from this list about seventy-five species under the family *Aecidiaceae.*

The collection made by Dr. Stevens proved so representative of the Porto Rican rust flora in particular and of the West Indian in general that it has required little additional space to mention all other collections from the region known to the writer. No careful attempt has been made to secure all references made in literature, where the material was not available for examination. It is believed, however, that the presentation here made is a fairly exhaustive record of the West Indian *Uredinales.* After the enumeration of species in the Stevens collection, a list of twelve species is given, which embraces all material from Porto Rico secured by other collectors, so far as the writer knows, that

was not represented in the Stevens collection. We may say, therefore, that the present known rust flora of Porto Rico numbers 121 species or, eliminating possible duplication (ten species of *Aecidium*), 111 species.

From all the other West Indian islands (excluding Trinidad) an additional nineteen species have come to light, which are given in a separate list. This makes 140 species of rusts for the West Indies, or by omitting undistributed aecia 130 species. Doubtless a few species already recorded have been overlooked. Unquestionably many species yet await the collector.

The writer desires to express his appreciation of Dr. Stevens' courtesy in supplying his material so unreservedly for study, and for information of various kinds regarding the island flora. He also wishes to extend thanks to the staff of the New York Botanical Garden, and to Prof. A. S. Hitchcock, Agrostologist of the U. S. Department of Agriculture, and to others who have assisted in the determination of the hosts. Especial recognition is due Mr. Percy Wilson of the N. Y. Bot. Garden for the unlimited patience and ready acumen, which he brought to bear in working over the great number of fragmentary specimens, and searching out corroborative or illustrative material from the phanerogamic herbarium, in order to determine the hosts with certainty and to extend knowledge of the range of the rusts.

## FAMILY: **Coleosporiaceae**

1. COLEOSPORIUM ELEPHANTOPODIS (Schw.) Thüm. Myc. Univ. *953*. 1878.

ON CARDUACEAE:

*Elephantopus mollis* H.B.K., Maricao, Jan. 10,* *201*, Jan. 15, *287*, April 3, *869*; Corozal, Feb. 21, *411*; Yauco, Oct. 3, *3154*, *3248*; Jajome Alto, Dec. 3, *5638*; Jayuya, Dec. 17, *5997*; Mayagüez, Dec. 25, *6294*; River junction below Utuado, Dec. 30, *6600a*; St. Ana, Dec. 31, *6623*; Preston's ranch near Naguabo, Dec. 31, *6682*; without locality or date, *513*.

* All dates in citation of the Stevens Porto Rican material are to be considered in the year 1913, unless otherwise stated.

The species has also been collected on *E. mollis* at Mayagüez, by A. A. Heller, Feb. 9, 1900, II & III, *4569*, at Bayamon, by E. W. D. Holway, Jan., 1911, and at Rio Piedras, by Johnston & Seaver, Dec., 1913, II, *1108*. It was a portion of the Heller collection that is the basis of the entry in N. Am. Flora, vol. 7, p. 90, under *Elephantopus scaber*, a species not represented in the American flora, but belonging to the Eastern Hemisphere, although both North and South American collections have been reported under that name.

Material has also been examined on *E. mollis* from Cuba and Jamaica, and on *E. angustifolius* Sw. from St. Vincent.

2. COLEOSPORIUM IPOMOEAE (Schw.) Burr. Bull. Ill. Lab. Nat. Hist. **2**: 217. 1885.

ON CONVOLVULACEAE:

*Ipomoea Batatis* Lam., Preston's ranch near Naguabo, Dec. 31, II, *6668*.

*Ipomoea Nil* Roth, Guayanilla, Nov. 13, II, *5898*.

*Jacquemontia tamnifolia* (L.) Griseb., Rio Piedras, Nov. 10, II, *5728*.

Material has also been examined on *Ipomoea littoralis* Blume, from San Juan, Jan., 1911, II, E. W. D. Holway, on *I. stolonifer* (Cyrill) Poir., from Vieques Island, Jan., 1914, II, J. A. Shafer *2406*, on *Quamoclit coccinea* (L.) Moench, Vieques Island, Jan., 1914, II, J. A. Shafer.

Collections have been seen on *I. Nil* and *Q. coccinea*, from St. Croix, and on *J. tamnifolia*, from Cuba.

3. COLEOSPORIUM PLUMIERAE Pat. Bull. Soc. Myc. Fr. **18**: 178. 1902.

ON APOCYNACEAE:

*Plumiera Krugii* Urban, Maricao, Jan. 10, II, *290*, Oct. 20, 1912, II, *28c*; Monte Alegrillo, Nov. 14, II, *4525*.

*Plumiera obtusa* L., Mona Island, Dec. 20, 21, II, *6101*.

The two hosts have not before been reported for North America. A specimen on *P. obtusa* has been received from Mel. T. Cook, collected at Santiago de las Vegas, Cuba, June, 1906.

The species was previously known on *P. alba* L. from Guadeloupe, and on *P. rubra* L., from Cuba.

FAMILY: **Uredinaceae (Melampsoraceae)**

4. PHYSOPELLA VITIS (Thüm.) Arth. Result Sci. Congr. Bot. Vienne 338. 1906.

*Uredo Vitis* Thüm. Pilze Weinst. 182. 1878.

*Uredo Vialae* Lagerh. Compt. Rend. Acad. Sci. Paris **110**: 729. 1890.

*Phakopsora Vitis* Sydow, Hedwigia Beibl. **38**: 141. 1899.

ON VITACEAE:

*Vitis vinifera* L., Pastillo Springs, Nov. 10, *5718*; Mayagüez, Dec. 26, *6304*, Jan. 5, 1914, *6731*.

Until full life history is known any generic assignment of species must generally remain somewhat doubtful. The only question involved in making the record in the present instance is whether or not this species, which was the type of the genus *Physopella,* differs sufficiently in important characters to keep it out of the earlier genus *Phakopsora,* to which it is assigned in Sydow's Monog. Uredinearum (**3**: 410. 1914). *Phakopsora* has a similar telial sorus, but the uredinial sorus, according to Magnus, Sydow, and others, for the writer has not seen suitable material, possesses a peridium opening by a central pore, whereas in the species on *Vitis* the uredinial sorus possesses peripheral free paraphyses. In no genus well established by species of fully known life histories is such an association of characters known. The species on *Vitis* is, therefore, listed under *Physopella,* rather than under *Phakopsora,* as better representing present knowledge of distinctions, while at the same time disavowing assumption of relationships. This limitation of the generic character of *Physopella,* taken in connection with other information brought to light since the establishment of *Physopella* as a genus in 1906, throws out all species that are listed under the genus in the N. Am. Flora, except the type.

So far the species in the West Indies has only been found on the cultivated grape, and only in the uredinial stage. It has been collected near Kingston, Jamaica, by G. von Lagerheim in

1889, by T. D. A. Cockerell in 1892, and by F. S. Earle in 1902. A collection was made at Havana, Cuba, by E. W. D. Holway in 1903.

5. KUEHNEOLA FICI (Cast.) Butler, Ann. Myc. **12**: 76. 1914.
*Uredo Fici* Cast.; Desmaz. Pl. Crypt. *1662*. 1848.
*Uredo ficicola* Speg. Anal. Soc. Ci. Argent. **17**: 120. 1884.
*Uredo ficina* Juel, Bih. K. Sv. Vet.-Akad. Handl. **23(3)**[10]: 25. 1897.
*Uredo moricola* P. Henn. Hedwigia **41**: 140. 1902.
*Physopella ficina* Arth. N. Am. Flora **7**: 103. 1907.
*Physopella Fici* Arth. N. Am. Flora **7**: 103. 1907.

ON ARTOCARPACEAE:

*Ficus laevigata* Vahl, Santurce, Jan. 22, *257* (Barth. N. Am. Ured. *920*); Vega Baja, Feb. 20, *461*, May 18, *2044*, Dec. 31, *6621*, Mona Island, Dec. 20, 21, *6078*, *6179*, *6423*; Cabo Rojo, Dec. 27, *6461*; River junction below Adjuntas, Dec. 30, *6614*.

*Ficus* sp. indet., Jayuya, March 1, *426*.

This species was also collected on *Ficus Carica* L., at San Juan, Porto Rico, May, 1903, F. S. Earle, *33*.

Although this rust is doubtless common wherever figs are grown, yet the only other collections that are represented in the Arthur Herbarium from the West Indies are from Santiago de las Vegas, Cuba, on *F. Carica*, by W. T. Horne, March 13, 1906, and by Mel. T. Cook, July 21, 1906.

Until recently no teliospores of this species have been known. They were found in India by E. J. Butler (l. c.) on *Ficus glomerata*. Mr. Butler has given a good description of the fungus, with a figure showing germination of the teliospores. The assignment of the species to *Kuehneola* seems the best disposition of it that can be made at present. It should be borne in mind, however, that the position of the species remains doubtful so long as the full life history is not known. It may be assumed that pycnia and primary uredo may occur in a region where teliospores are produced, but when teliospores are absent and the reproduction is by secondary uredo there is no possibility of pycnia occurring.

The two species of *Ficus* rust described in N. Am. Flora (**7**: 103. 1907) are here united. It was found in carefully studying the ample collections by Dr. Stevens that they showed great variation in size of spores and development of paraphyses. Upon comparing data from all sources available there remained no doubt that only one species is represented, whether paraphyses with thick or thin walls are present in full development or practically absent, or whether the spores are larger or smaller, etc.

The genus *Kuehneola* is here associated with *Physopella, Phakopsora, Pucciniastrum,* etc., in the *Uredinaceae,* instead of with *Phragmidium* in the *Aecidiaceae,* as heretofore. The change is made on account of the evident unpedicelled, catenulate teliospores, corresponding to those of *Melampsoropsis* and other genera of the former family, but clearly alien to the *Aecidiaceae.*

6. KUEHNEOLA GOSSYPII (Lagerh.) Arth. N. Am. Flora **7**: 187. 1912.

*Aecidium desmium* Berk. & Br. Jour. Linn. Soc. **14**: 95. 1873.
*Uredo Gossypii* Lagerh. Jour. Myc. **7**: 48. 1891.

ON MALVACEAE:

*Gossypium barbadense* L., Isabela, Nov. 22, *5226*; Mona Island, Dec. 20, 21, *6141.*

*Gossypium brasiliense* Macf., River junction below Utuado, Dec. 7, *6052.*

The rust was found on *G. hirsutum* L. at Mayagüez, P. R., May, 1903, by F. S. Earle, *78.*

The only other specimen in the Arthur Herbarium from the West Indies is one collected on a species of tree cotton at Santiago de las Vegas, Cuba, Aug., 1904, by C. F. Baker (Barth. Fungi Columb. *2489*), although the rust is doubtless rather common in the warm regions adapted to cotton growing.

7. **Milesia columbiensis** (Dietel) comb. nov.

*Milesina columbiensis* Dietel; Mayor, Mem. Soc. Neuch. Sci. **5**: 559. 1913.

ON POLYPODIACEAE:

*Nephrolepis rivularis* (Vahl) Urban, without locality, Nov., *4504*; Agucaltaria, Nov. 25, *4855.*

The collections here listed were the first North American representatives of the genus seen by the writer, but they were followed almost immediately by a collection of **Milesia Kriegeriana** (Magn.) comb. nov. (*Milesina Kriegeriana* Magn.) on *Aspidium marginale,* from Hudson, Quebec, Canada, communicated by W. P. Fraser, who made the collection in June, 1913.

Up to the present time the only other North American collection known to the writer, that should be placed in the genus, was found on a specimen of *Dryopteris patens* (Sw.) Kuntze in the fern collection of the N. Y. Bot. Garden, obtained at Whitfield Hall, Jamaica, 3,000 feet altitude, April 20, 1903, L. M. Underwood *2522*. The species appears to be similar to *M. Kriegeriana,* but sufficiently distinct to merit a separate name. It may be called **Milesia consimilis** sp. nov., and characterized by the ellipsoid or obovoid urediniospores, being 16–21 by 26–29 $\mu$, with colorless wall, 2.5–3.5 $\mu$ thick, moderately to sparsely echinulate with rather large points. The peridium is similar to that in *M. Kriegeriana.*

I am using the genus name *Milesia,* as I believe it was properly established upon the most distinctive spore form that could have been selected (Cf. Science **40**: 935. 1914), and that the rechristening by Magnus (Ber. Deut. Bot. Ges. **27**: 325. 1909) was superfluous, although conforming to the ruling of the Brussels Congress.

8. CEROTELIUM CANAVALIAE Arth. Bull. Torrey Club **33**: 30. 1906.

ON FABACEAE:

*Canavalia ensiformis* DC., Mayagüez, May 4, II, *1833*; Manati, Nov. 5, II, *4321*.

The species has heretofore only been known from the type collection, which was made at Mayagüez, P. R., April 16, 1904, by G. P. Clinton.

FAMILY: **Aecidiaceae (Pucciniaceae)**

9. RAVENELIA CAULICOLA Arth. N. Am. Flora **7**: 143. 1907.

ON FABACEAE:

*Cracca cinerea* (L.) Morong, Desecheo, May 31, II, *1621*; Quebradillas, Nov. *22*, II, *5016*.

Only two other collections of this West Indian rust are known to the writer. One was found at Cataño, P. R., Feb. 14, 1914, by Johnston & Seaver, *1370*, and the other is the type collection, which was taken from a phanerogamic specimen in the Field Museum, Chicago, obtained by Britton & Millspaugh at Cave Cay, Bahamas, Feb. 19, 1905. Both collections are on *Cracca cinerea*.

10. RAVENELIA INDIGOFERAE Tranz. Hedwigia **33**: 369. 1894.

ON FABACEAE:

*Indigofera suffruticosa* Mill. (*I. Anil* L.), Boqueron, Feb. 15, II, *340*, II, *355*; Bayamon, Feb. 16, II, *399*; Jayuya, March 31, *692*; Mayagüez, Aug. 13, II, *3021*; Aguada, Nov. *22*, *5106*.

It was also collected on the same host at Cataño, P. R., Feb. 14, 1914, by J. R. Johnston *1368*.

The other West Indian islands represented in the Arthur Herbarium are Bermuda, by W. G. Farlow, Jan., 1881; Cuba by W. T. Horne, March 15, 1905, and April 5, 1906, by C. F. Baker, Jan. 15, 1907 (Barth. Fungi Columb. *2475*), all three from Santiago de las Vegas; and Jamaica, by F. S. Earle, *33*, E. W. D. Holway, Feb. 17, 1915, *215*, all the collections being on *I. suffruticosa*.

11. RAVENELIA INGAE (P. Henn.) Arth. N. Am. Flora **7**: 132. 1907.

ON MIMOSACEAE:

*Inga vera* Willd., Monte Montosa, Oct. 13, 1912, *g76*, Oct. 14, 1912, *28d*; Monte Alegrillo, June 20, *2376*.

The fungus on the same host has also been collected in Porto Rico at Ponce, O. W. Barrett, Aug., 1904. No other West Indian collections are known to the writer.

On some of the leaves the fungus forms loose brown masses, consisting mostly of spores, that have the appearance of insect ejecta. The resemblance is aided by the leaf being puffed and broken at these places, the spots often being a centimeter across.

12. **Ravenelia Stevensii** sp. nov.

Pycnia not seen.

Uredinia hypophyllous, numerous, scattered, round, small, 0.1–0.3 mm. across, subcuticular, early naked, dull cinnamon-brown, ruptured cuticle inconspicuous; paraphyses in a thick peripheral ring, upright, capitate to clavate, 9–12 by 37–45 μ, smooth, wall of head 2–5 μ, cinnamon-brown, passing into the thin-walled, colorless stipe; urediniospores oblong, cylindric-oblong, or narrowly obovoid, 8–13 by 25–30 μ; wall cinnamon-brown, paler below, uniformly thin, less than 1 μ, slightly thicker above, very finely and inconspicuously verrucose-echinulate, the pores usually indistinct, about 4, equatorial.

Telia hypophyllous, few, very small, subcuticular, blackish-brown; teliospore-heads chestnut-brown, 3–6 cells across, 40–63 μ across, each spore bearing 1–3 nearly hyaline tubercles, 2–3 μ thick, 6–19 μ long, 2–3 forked above; cysts hyaline, globoid, extending from periphery to pedicel, not bursting in water; pedicel hyaline, short, usually wanting.

ON MIMOSACEAE:

*Acacia riparia* H.B.K., Guayanilla, Nov. 13, II, III, *5881* (type); Vega Baja, Feb. 22, II, *366*, May 18, II, *2047*; Peñuelas, Nov. 8, II, *4895*.

This very distinctive species of *Ravenelia* is dedicated to Dr. F. L. Stevens, who has not only made all the collections of it so far known, but has supplied a wealth of material representing Porto Rican Uredinales far exceeding that of all previous collectors, as the present paper amply testifies.

13. PROSPODIUM APPENDICULATUM (Wint.) Arth. Jour. Myc. **13**: 31. 1907.

*Puccinia appendiculata* Wint. Flora **67**: 262. 1884.

ON BIGNONIACEAE:

*Stenolobium Stans* (L.) D. Don. (*Tecoma Stans* Juss.), Hormigueros, June 23, II, *2494*.

The other West Indian collections seen by the writer are by E. W. D. Holway in Cuba at Holquin and at Havana, 1903, by Dr. Stevens in Martinique, Aug. 4, 1913, *2974*, all three on *S. Stans* and all showing uredinia only, and one by Holway in Jamaica, on *S. Stans*, Feb., 1915, *222*, showing II & III.

### 14. **Argomyces insulanus** sp. nov.

Pycnia epiphyllous, subepidermal, few in crowded groups, globoid-flask-shaped, 105–175 by 170–200 μ.

Aecia uredinoid (primary uredo), hypophyllous, few surrounding the pycnia, sometimes confluent; aeciospores somewhat larger than the urediniospores. Otherwise same as the uredinia.

Uredinia hypophyllous, few, scattered, round or oblong, small, 0.3–0.5 mm. long, early naked, pulverulent, dull cinnamon-brown, ruptured epidermis evident; urediniospores ellipsoid or obovoid, 19–26 by 26–35 μ; wall cinnamon-brown, moderately echinulate, 1.5–2.5 μ thick, the pores usually three, equatorial or slightly subequatorial, indistinct.

Telia hypophyllous, few, usually scattered, round to oblong, 0.3–0.8 mm. long, early naked, dull cinnamon-brown, germinating at maturity, ruptured epidermis evident; teliospores broadly ellipsoid to ellipsoid-fusiform, 19–30 by 42–60 μ, obtuse, or somewhat attenuated at both ends, slightly constricted at septum; wall pale cinnamon-brown, thin, 1–1.5 μ, with a low hyaline papilla over the pore, disappearing at germination, smooth, the pore in lower cell near the septum; pedicel slender, colorless, once length of spore or less.

ON CARDUACEAE:

*Vernonia albicaulis* Pers., River junction below Utuado, Dec. 30, O, II, III, *6596* (type), O, II, III, *6589*.

*Vernonia longifolia* Pers., Villa Alba, Jan. 3, III, *113*.

This species differs from *Arg. Vernoniae* by the broad and much larger teliospores. It is notably distinct from *Puccinia Becki* Mayor and *P. Vernoniae-mollis* Mayor, both from Colombia, S. A., the former having very long, slender teliospores, and the latter very small teliospores.

*Arg. insulanus* also occurs on the island of St. Croix. It was collected by A. E. Ricksecker in 1896, and recorded by Ellis & Kelsey (Bull. Torrey Club **24**: 208. 1897), under the name of *Puccinia Vernoniae* Cooke. The determination was considered doubtful at the time. Although the type of *P. Vernoniae,* which is African, has not been seen, yet there is slight chance of the West Indian and African forms being the same. Another representative of the St. Croix rust has been communicated by Mr. Percy Wilson, who found it on a phanerogamic specimen collected in St. Croix, Jan. 17, 1896, on *V. albicaulis,* by Marion

Hoy *220*. The host species of the Ricksecker collection is clearly identical with the Hoy collection.

15. ARGOMYCES VERNONIAE Arth. N. Am. Flora **7**: 218. 1912.

ON CARDUACEAE:

*Vernonia borinquensis* Urban, Consumo, April 27, O. II. III, *809*; Jajome Alto, Dec. 3, O, II, III, *5684*; El Gigante near Adjuntas, Dec. 15, II, III, *5962*.

*Vernonia phyllostachya* (Cass) Gleason, Cabo Rojo, Dec. 27, II, III, *6473*.

The species was described from a Porto Rican collection from Cayey, on *V. borinquensis*, by E. W. D. Holway, Jan., 1911. The Stevens collections are the first additions to the type material so far seen. The shape and the pore arrangement as given for the urediniospores in the original description appear to need some modification. The spores may be ellipsoid, and the pores more than four and not strictly equatorial.

16. UROMYCES ERAGROSTIDIS Tracy, Jour. Myc. **7**: 281. 1893.

*Nigredo Eragrostidis* Arth. Result. Sci. Congr. Bot. Vienne 343. 1906.

ON POACEAE:

*Eragrostis tephrosanthus* Schult., Bayamon, Feb. 21, II, *442*.

The species was collected on the same host by Mr. & Mrs. A. A. Heller at Rio Piedras, Jan. 17, 1899, *197*, which is the only other West Indian collection known to the writer.

17. UROMYCES LEPTODERMUS Sydow; Sydow & Butler, Ann. Myc. **4**: 430. 1906.

*Puccinia* (?) *panicicola* Arth. Bull. Torrey Club **34**: 586. 1908.

*Nigredo leptoderma* Arth. N. Am. Flora **7**: 224. 1912.

ON POACEAE:

*Lasiacis divaricata* (L.) Hitchc. (*Panicum divaricatum* L.), Coleña, Nov. 3, *4528*; Utuado, Nov. 8, *4608*; San German, Dec. 8, *4677*, Dec. 12, *5857*; Maricao, Nov. 18, *4793*; Mona Island, Dec. 20, 21, *6089*, *6145*, *6425*.

*Lasiacis Sloanei* (Griseb.) A. S. Hitch. (*Panicum Sloanei* Griseb.), Arecibo, Jan. 17, 1914, *6805*.

*Panicum barbinode* Trin. (*P. molle* Auct. not Swartz), Guanica, Feb. 1, *350*; Boqueron, Feb. 15, *350 bis;* Mayagüez, March 26, *447*, March 9, *480*; Peñuelas, Nov. 8, *4560*.

Only one of these collections, *6145* from Mona Island, shows teliospores, and that only sparingly so.

A collection determined by Prof. Hitchcock to be on *Lasiacis Swartziana* Hitchc. (*Panicum lanatum* Sw. not Rottb.) was collected by R. Thaxter, 1891, in Jamaica, and communicated by W. G. Farlow, which shows both uredinia and telia. Material representing the species has also been collected at Santiago de las Vegas, Cuba, on *P. barbinode* and thought at first to show only uredinia, but on which a few telia have recently been detected. *L. Sloanei* is a host for the species not before reported.

18. **Uromyces ignobilis** (Sydow) comb. nov.

*Uredo ignobilis* Sydow, Ann. Myc. **4**: 444. 1906.
*Uromyces major* Arth. Bull. Torrey Club **38**: 377. 1911.
*Nigredo major* Arth. N. Am. Flora **7**: 225. 1912.

ON POACEAE:

*Sporobolus indicus* (L.) R. Br., Mayagüez, II, April 30, *925*.

The Stevens material agrees exactly with the description of *Uredo ignobilis* Sydow, the type being on *Sporobolus diandrus* from Pusa, India, and with the collection by E. J. Butler from the type locality, distributed in Sydow, Uredineen *2199*. The spores of the Porto Rican material also agree with the four-pored, thick-walled urediniospores of *Uromyces major,* the type of which is on some species of *Muhlenbergia* from the vicinity of the City of Mexico. The genera *Sporobolus* and *Muhlenbergia* are only technically different, so that it is not surprising to find the same tropical rust on hosts belonging to both genera, and from very widely separated localities. The three stations mentioned are the only ones yet known for the species.

19. UROMYCES RHYNCOSPORAE Ellis, Jour. Myc. **7**: 274. 1893.

*Nigredo Rhyncosporae* Arth. Result. Sci. Congr. Bot. Vienne 344. 1906.

ON CYPERACEAE:

*Rynchospora micrantha* Vahl, Preston's ranch near Naguabo, Dec. 31, *6766*.

Porto Rican material on the same host has been seen from Tabucoa, taken from a phanerogamic collection by Boeckeler *5301*, Oct. 12, 1886, and on *R. aurea* Vahl, collected by G. P. Clinton, at Mayagüez, April 13, 1904.

Collections have also been examined on *R. cyperoides* (Sw.) Mart. from Bahamas, on *R. distans* (Michx.) Vahl, from Cuba and Bermuda, and on *R. polyphylla* Vahl, from Jamaica, all of which are noted in the N. Am. Flora, vol. 7, pp. 232, 233.

20. UROMYCES SCLERIAE P. Henn. Hedwigia Beibl. **38**: 67. 1899.

*Nigredo Scleriae* Arth. Result. Sci. Congr. Bot. Vienne 344. 1906.

ON CYPERACEAE:

*Scleria pterota* Presl. Luguillo forest, Dec. 2, *5552*.

Material has also been seen on the same host from Bayamon, E. W. D. Holway, Jan., 1911, and on an undetermined species of *Scleria* from near Santurce, A. A. Heller, Jan., 1903, *6447*.

21. UROMYCES COMMELINAE (Speg.) Cooke, Trans. Roy, Soc. Edinb. **31**: 342. 1888.

*Uredo Commelinae* Speg. Anal. Soc. Ci. Argent. **9**: 172. 1880.

*Uredo Commelinaceae* Ellis & Kelsey, Bull. Torrey Club **24**: 209. 1897.

*Nigredo Commelinae* Arth. N. Am. Flora **7**: 237. 1912.

ON COMMELINACEAE:

*Commelina virginica* L. (*C. elegans* H.B.K.), Desecheo, May 31, *1578c*.

The only other West Indian collection seen is on the same host from St. Croix, made in 1896 by A. E. Ricksecker, which was used as the type for Ellis & Kelsey's name.

In Mayor's work on the Colombian rusts this species is recorded from Jamaica on *Commelina nudiflora* and *Tradescantia multiflora*. It is doubtless a common rust throughout the tropical world, but too inconspicuous to be often collected.

The single collection of this species by Stevens shows only uredinia, as has been the case with most other collections. The type collection for Cooke's name, which has been examined through the kindness of the Director of the Kew Gardens, shows both telia and uredinia. This collection came from Socotra, an island at the mouth of the Gulf of Aden. Other collections with both telia and uredinia have been examined from the eastern border of Africa along the coast of the Red Sea, and also a collection from the Malabar Coast of western India. No telia are known on any collection from the western hemisphere; and no pycnia or aecia from any part of the world have been associated with the species. It was placed in *Nigredo* on the assumption that the morphological and host characters warranted the belief in pycnia and aecia of a certain form to complete the life cycle.

22. **Uromyces Caesalpiniae** (Arth.) comb. nov.

*Ravenelia Caesalpiniae* Arth. Bull. Torrey Club **31**: 5. 1904.

ON MIMOSACEAE:

*Mimosa ceratonia* L., Bayamon, Feb. 19, O, II, III, *393*, March 2, *508 bis*, May 21, *1868*; Vega Baja, March 2, *508*, May 21, *1929*, Nov. 5, *4264*; Monte Alegrillo, June 20, *2335*; St. Catalina, Aug. 28, *2723*; Cabo Rajo, July 28, *3163*; Indiera Fria, Maricao, *3454*; Abonita, Nov. 3, *4020*; Vega Alta, November, *4153*; San Sebastian, Nov. 22, *4510*; Lares, Nov. 22, *4850*; Manati, *5306*; Luguillo forest, Dec. 2, *5432*; San German, Dec. 8, *5764*; El Gigante near Adjuntas, Dec. 15, *5970*; Preston's ranch near Naguabo, Dec. 31, *6657*.

The type material of *Ravenelia Caesalpiniae* Arth., now in the Arthur Herbarium, was scanty, consisting of two compound leaves, bearing together twelve leaflets, moderately supplied with pycnia and uredinia, but no telia. The collection was made near Bayamon, P. R., in 1901, by L. M. Underwood and R. F. Griggs,

both excellent botanists. It was labeled by the collectors as "on *Caesalpinia.*" As the pycnia and uredinia closely simulate those of various species of *Ravenelia,* the material was named accordingly.

No other collections were brought to light until those by Dr. Stevens arrived, the earliest being from Bayamon, gathered Feb. 19 and March 2, 1913. This material showed telia, as well as pycnia and uredinia, and consisted of numerous leaves accompanied by pods. It was submitted to the New York Botanical Garden for determination of the host. In the meantime Dr. N. L. Britton examined the host in the field for Dr. Stevens and pronounced it to be *Mimosa ceratonia,* most probably, and this determination was repeatedly and independently confirmed at the New York herbarium by Mr. Percy Wilson.

Now that the full life-cycle of the species is known, it proves to be a most difficult one to place. If we consider the structure and formation of all three kinds of sori, the peculiar urediniospores with their paraphyses, and the host relationship, the rust is preponderatingly like a *Ravenelia,* but the teliospores are borne singly and simulate a *Uromyces.* With present knowledge there seems no better way to do than enter the species under *Uromyces.* Technically it would fall under *Klebahnia.* The specific name is an unfortunate one, but we hesitate to add another to synonymy. Description of the telia is here appended.

Pycnia and uredinia as given in N. Am. Flora **7**: 141. 1907.

Telia amphigenous, similar in size and appearance to the uredinia except much darker in color, chocolate-brown, subcuticular, ruptured epidermis noticeable; paraphyses wanting; teliospores obovoid, 15–20 by 24–34 μ, usually narrowed below, rounded or obtuse above, often with a hyaline papilla over the germ-pore; wall chocolate-brown above, much paler below, thin at the sides, 1 μ, thickened at apex, 3–5 μ, smooth; pedicel somewhat tinted, half length of spore or shorter, thick, 5–7 μ.

23. UROMYCES JAMAICENSIS Vesterg. Ark. Bot. Stockh. $4^{15}$: 33. 1905.

ON CASSIACEAE (CAESALPINIACEAE):

*Bauhinia pauletia* Pers., San German, Jan. 19, *238*, Nov. 8, *5786*, Dec. 12, *5866*; Mayagüez, Oct. 31, *3924*.

A collection on the same species of host was also made at Mayagüez, January, 1911, by E. W. D. Holway.

The type of the species came from Jamaica, as the name indicates, and is on an undetermined species of *Bauhinia,* having a similar leaf to that of *B. pauletia,* but doubtless specifically different from it. The spores of the type are slightly smaller for the most part than are those from the Porto Rican material. One collection has been examined from Mexico on *B. divaricata.* All collections agree in showing only telia, and in having the appearance of a micro-form, that is, in being short-cycled and incapable of germination immediately upon maturity.

24. UROMYCES APPENDICULATUS (Pers.) Fries, Summa Veg. Scand. 514. 1849.

*Nigredo appendiculata* Arth. Result. Sci. Congr. Bot. Vienne 343. 1906.

ON FABACEAE:

*Phaseolus adenanthus* G. Meyer, Vega Baja, Feb. 22, *374 bis;* Mayagüez, May 8, *1139.*

*Phaseolus vulgaris* L., Cabo Rojo, June 15, *2270.*

*Vigna repens* (L.) Kuntze, Arecibo, May 21, *1760.*

*Vigna vexillata* (L.) A. Rich., Mayagüez, June 14, *2216.*

The species has also been collected in Porto Rico on *P. adenanthus* by E. W. D. Holway, Caguas, January, 1911, by Mr. & Mrs. A. A. Heller on a phanerogamic specimen, Rio Piedras, April, 1889, *1221,* and by Britton & Cowell on a phanerogamic specimen, near Arecibo, March 14, 1908, *308;* and also on *P. vulgaris* by F. S. Earle, La Carmelita, June, 1903, *110,* and by G. P. Clinton, same locality, Apr. 18, 1904, *124.* The last collection bears teliospores as well as urediniospores.

On phanerogamic specimens in the herbarium of the New York Botanical Garden the uredinial stage has been found on both *Vigna repens* and *V. vexillata* from Cuba.

While the pores in the urediniospores of this species are usually two or three, and equatorial, as given in the N. Am. Flora **7**: 257, they are sometimes four in number, and sometimes are distinctly superequatorial. The Stevens' collections from Porto Rico show

only uredinia, and the spores are 2-pored. On *Phaseolus* the pores are mostly equatorial, but on *Vigna* they are markedly superequatorial.

25. UROMYCES DOLICHOLI Arth. Bull. Torrey Club **33**: 27. 1906.
*Puccinia Dolichi* Arth. Bull. Torrey Club **33**: 28. 1906.
*Uredo Dolichi* Arth. Bull. Torrey Club **33**: 513. 1906.
*Nigredo Dolicholi* Arth. N. Am. Flora **7**: 258. 1912.

ON FABACEAE:

*Cajan Cajan* (L.) Millsp. (*Cajanus indicus* Spreng.), Guayanilla, Jan. 4, *87*; Corozal, Feb. 21, *418*; Jayuya, March 31, *693*; Rosario, Oct. 27, *3832*; Mayagüez, Oct. 27, *3861*; Vega Baja, Nov. 5, *4241*; Menati, Nov. 5, *4307*; Quebradillas, Nov. 22, *5119*.

*Dolicholus reticulatus* (Sw.) Millsp. (*Glycine reticulata* Sw., *Rhynchosia reticulata* DC.), Boqueron, Feb. 15, II, *337*; Aguada, Nov. 22, II, *5091*; Vega Baja, May 18, *2048*.

A collection was made on *D. reticulatus* by A. A. Heller at Limestone Hills near Bayamon, Jan. 21, 1903, and on *C. Cajan* by J. A. Stevenson *2474*, at Campoalegre, Dec. 22, 1914. The species has also been found on a phanerogamic specimen of *C. Cajan* from St. Domingo.

The type collection of this species is in the Arthur Herbarium at Lafayette, Ind., and was obtained at San Angelo, Texas, Oct. 19, 1904, by C. L. Shear. The host was determined by Dr. E. L. Greene as *Rhynchosia texana* T. & G., now called *Dolicholus texanus* (T. & G.) Vail. It consists of a few intertwined stems, and about twenty two small, well-rusted leaves. The same collection was issued in Bartholomew, Fungi Columbiani *4091*.

A re-examination of the type collection shows that a more exact statement in the description of the species would be to say *pores 2 to 4, usually three,* instead of "pores 4." This statement of the pore-character also better fits other collections recently studied, and especially the Porto Rican ones here listed.

The collection named *Puccinia Dolichi* from a few teliospores, afterwards found to be strays, and then called *Uredo Dolichi*, was made by E. W. D. Holway, at Aguacate, Cuba, March 23,

1903, and was labeled as on "*Dolichos reticulatus.*" The genus *Dolichos,* according to Engler & Prantl, Pflanzenfamilien, is closely related to *Phaseolus* and *Vigna,* genera which bear *Uromyces appendiculatus,* and to this species the rust was accordingly assigned in the North American Flora, vol. 7, page 257. The authority, "Hochst." for the name of the host was supplied from the Kew Index. Recently, becoming suspicious of the correctness of the name, the type material was submitted to the New York Botanical Garden, and it has been determined by Mr. Percy Wilson, March 6, 1915, as *Dolicholus reticulatus* (Sw.) Millsp. The latter genus belongs to a different group of genera from that of *Dolichos.* The rust on the Cuban host agrees well with that from Texas, except that it shows only uredinia.

Two collections of this species from South America have been examined, and show uredinia which agree well with the North American material. One was collected by M. St. Pennington, near San Fernanda, Argentina, 1902, on *Rhynchosia Senna* Gill. The other was issued in Spegazzini's Dec. Myc. Arg. *20,* and was collected by Spegazzini in 1881, at Bagnado de San Jose de Flores, Argentina, on "*Rhyncosia*" sp. The two collections are given the same name, *Uredo pamparum,* and appear to be on the same host. The locality for the latter collection is the place where Spegazzini collected the type of *Uredo pamparum,* one year earlier. In Anal. Soc. Ci. Argent. vol. 9, page 173, this last species is established as on *Phaseolus prostratus,* a determination which for a variety of reasons the writer believes to have been an error for *Rhynchosia* (*Dolicholus*) *Senna.*

A collection of the same species of rust on still another species of *Rhynchosia,* thought to be *R. longeracemosa* Mart. & Gall., has been included in Mayor's Contribution à l'étude de Urédinees de Colombie, and said to agree well with the North American *U. Dolicholi,* under which name it is listed.

The several collections on *Cajanus indicus* show such close agreement in the spore and sorus characters with those on *Dolicholus reticulatus,* and the hosts being closely akin, there seems ample reason for placing them here. So far as one can judge from the description, *Uredo Cajani* Syd. (Ann. Myc. **4**: 442.

Oct., 1906) refers to the same rust. All West Indian collections so far seen on this host show uredinia only, usually with three equatorial pores in the urediniospore.

26. UROMYCES HEDYSARI-PANICULATI (Schw.) Farl.; Ellis, N. Am. Fungi *246*. 1879.

*Uromyces solidus* Berk. & Curt. Grevillea **3**: 57. 1874.

*Nigredo Hedysari-paniculati* Arth. Result. Sci. Congr. Bot. Vienne 343. 1906.

ON FABACEAE:

*Meibomia axillaris* (Sw.) Kuntze (*Desmodium axillare* DC.), Cabo Rojo, June 15, *2259*.

*Meibomia Scorpiurus* (Sw.) Kuntze (*Desmodium Scorpiurus* Desv.), Mayagüez, May 24, *1375*; Peñuelas, Dec. 15, *5936*.

The collections here included possess only uredinia, which are, however, in every way typical of the species. The spores are broadly ellipsoid, often globoid, 18–21 by 21–24 $\mu$; wall chestnut-brown, about 1.5 $\mu$ thick, the pores 3–5, scattered, or sometimes appearing equatorial. Thin-walled, hyphoid, paraphyses are present.

This rust has not before been reported from the West Indies. I have, however, been able to detect it on phanerogamic collections in the herbarium of the New York Botanical Garden. It occurs on a specimen of *M. Scorpiurus* collected by A. A. Heller, near Yauco, P. R., Dec. 15, 1902, and on the same host collected by Percy Wilson, at Rio San Miguel, Cuba, Dec. 17, 1910, *9380*.

Through the kind assistance of Mr. Percy Wilson the rust has also been brought to light from the same source on *Meibomia tortuosum* (Sw.) Kuntze, collected at Yauco, P. R., Oct. 3, 1913, by Stevens & Hess, *3252*, and collected in Cuba, near Vento, 1907, Baker, Tracy & Hasselbring *3079*, and near Herradura, 1910, Britton & Earle *6591*.

The same rust on both *M. Scorpiurus* and *M. tortuosum* is known from the southern part of continental North America. All the collections here referred to show only uredinia, but they appear to be identical with authenticated material of the species.

It has not been possible to examine type material of *Uredo Desmodii-tortuosi* P. Henn. (Hedwigia **35**: 252. 1896), which was founded on a collection of *Meibomia tortuosum* from Fajardo, P. R., April 17, 1885, O. Sintenis. However, the claim of the author that it is distinct from *Urom. Hedysari-paniculati* by reason of its smooth spores, seems open to doubt. As no rust is known having truly smooth urediniospores, it is probable that Hennings' material possessed fine echinulation, which was overlooked. As all other terms of the characterization accord well with the common species on *Meibomia,* it may tentatively be assumed that the form named by Hennings is not essentially distinct.

27. UROMYCES NEUROCARPI Dietel, Hedwigia **34**: 292. 1895.
*Uromyces insularis* Arth. Bull. Torrey Club **33**: 515. 1906.
*Nigredo Neurocarpi* Arth. N. Am. Flora **7**: 258. 1912.

ON FABACEAE:

*Clitoria cajanifolia* (Presl) Benth. (*Neurocarpum cajanifolium* Presl), Mayagüez, Jan. 30, *344*; without locality or date (in letter dated June 18, 1913), *2146c*.

*Clitoria rubiginosa* Juss. (*C. glycinoides* P. DC.), Dorado, Nov. 25, *5314*, *5315*.

No pycnia or aecia have yet been discovered for this species, but it is highly probable that they occur occasionally. Telia, in addition to uredinia, are shown only on no. *344* of the specimens here listed.

The type collection of *U. insularis* was on *C. cajanifolia,* from Dorado, P. R., 1887. The species was also collected on this host near San Juan, in 1914, by Britton and Cowell *1469*. On *C. rubiginosa* it has been found at Santurce, P. R., Feb., 1914, by J. R. Johnston *1339*, and in both Jamaica (1906) and Cuba (1903).

28. UROMYCES PROËMINENS (DC.) Pass. Rab. Fungi Eur. *1795*. 1873.

*Uromyces Euphorbiae* Cooke & Peck; Peck, Ann. Rep. N. Y. State Mus. **25**: 90. 1873.

*Uromyces euphorbiicola* Tranz. Ann. Myc. **8**: 8. 1910.
*Nigredo proëminens* Arth. N. Am. Flora **7**: 259. 1912.

ON EUPHORBIACEAE:

*Chamaesyce hirta* (L.) Millsp. (*Euphorbia hirta* L., *E. pilulifera* L.), Cataño, Nov. 6, *4154*; Vega Baja, Nov. 5, *4325*; Lares, Nov. 22, *4839 bis;* Coamo Springs, Nov. 16, *4906*; Aricebo, Nov. 22, *5015*; Aguado, Nov. 22, *5104*; Guayama, Dec. 4, *5339*; Rio Piedras, Nov. 13, *5703*; San German, Nov. 8, *5804*; Guayanilla, Nov. 13, *5868*.

The species has also been collected on *C. hirta* at Mayagüez, by G. P. Clinton in April, 1904, *169*, and at Camuy, by Underwood & Griggs in July, 1901, *199*.

Material has been examined from other West Indian islands as follows: Bahamas, on *C. hypericifolia* (L.) Millsp., *C. prostrata* (Ait.) Small, and *Poinsettia heterophylla* (L.) Kl. & Garcke; Cuba, on *P. heterophylla;* Jamaica, on *C. hirta* (L.) Millsp., *C. prostrata, C. serpens* (H.B.K.) Small, and *P. heterophylla;* St. Croix, on *C. prostrata;* all of which collections but one are cited in the North American Flora, vol. 7, pp. 260, 261.

29. **Uromyces Janiphae** (Wint.) comb. nov.

*Uredo Janiphae* Wint. Grevillea **15**: 86. 1887.
*Uromyces dichrous* Vesterg. Micr. Rar. Sel. *1516*. 1913. Hyponym.

ON EUPHORBIACEAE:

*Manihot Manihot* (L.) Cockerell (*M. utilissima* Pohl, *Jatropha Manihot* L., *Janipha Manihot* H.B.K.), Vega Baja, Nov. 5, II, *4261*.

This rust appears to be common in the warm regions of America on various forms of the cultivated cassava. That it occurs in the Old World as well is probable, but I have seen no specimens. Winter's description was founded on material collected near Sao-Francisco, Brazil, in 1887, by E. Ule *362*. Vestergren's material was collected by E. W. D. Holway at Guadalajara, Mexico, in 1903, and is the only collection known to the writer showing both uredinia and telia. The original num-

ber of the collection is *5050*. The same collection has been issued in Vestergren's Micr. Rar. Sel. *1516*, and in Bartholomew's Fungi Columb. *4093*, and N. Am. Ured. *391*. Whether the species possesses aecia or not is not yet known.

The species differs from *Uromyces Jatrophae* Diet. & Holw., for which it has been mistaken and to which it is closely related, by the thicker-walled urediniospores, and the dark-beaked teliospores.

The species on the same host has also been collected on the island of Jamaica by E. W. D. Holway, Feb. 17, 1915, *211*.

30. UROMYCES CESTRI Mont. in Gay, Hist. Chile **8**: 49. 1852.
*Aecidium Cestri* Mont. Ann. Sci. Nat. II, **3**: 356. 1835.
*Uredo Cestri* Mont. Prodr. Flor. Fernandes, no. 35. 1835.
*Uromycopsis Cestri* Arth. Result. Sci. Congr. Bot. Vienne 345. 1906.

ON SOLANACEAE:

*Cestrum laurifolium* L'Her., Cabo Rojo, June 15, *2251*; Monte Alegrillo, Nov. 14, *4822*; Quebradillas, Nov. 22, *4995*; San German, Nov. 8, *5823*; Arecibo—Lares road, Jan. 21, 1914, *6787*; Arecibo, Jan. 17, 1914, *6803*.

*Cestrum macrophyllum* Vent., Barros, Jan. 2, *124*, *144*; Maricao, Jan. 10, 1912, *230*, April, I and III, *771*, April 3, *772*, no date, *3499*; Rio Maricao above Maricao, Sept. 20, 3640; Ponce, Nov. 8, *4353*, *4364*; Monte Alegrillo, no date, *4719*, Nov. 14, *4766*; Lares, Nov. 22, *4847*; Luguillo forest, Dec. 2, *5550*, *5605*; Monte de Oro, Dec. 3, *5713*; River junction below Utuado, Dec. 16, *6036*, Dec. 17, *6050*, Dec. 30, *6515*; Preston's ranch, Dec. 31, *6708*.

The aecia produce a considerable hypertrophy, and the peridia being evanescent, the spots soon take on the appearance of insect galls. The telia are not common, only one of the collections, no. *771*, showing a few sori on the same leaf with aecia. No pycnia of this species have yet been recorded.

The species is also known on three other West Indian islands: Jamaica, St. Jan and Tortola.

31. UROMYCES HELLERIANUS Arth. Bull. Torrey Club **31**: 2. 1904.

*Nigredo Helleriana* Arth. N. Am. Flora **7**: 267. 1912.

ON CUCURBITACEAE:

*Cayaponia americana* (Lam.) Cogn., Maricao, *723*; Cabo Rojo, Dec. 27, *6459*.

*Cayaponia racemosa* (Sw.) Cogn., Corozal, Feb. 21, *422*.

*Melothria guadalupensis* (Spreng.) Cogn., without locality or date (1913 ?), *614*; Yauco, Oct. 3, *3130*; Rosario, Oct. 27, *3840*; Utuado, Nov. 8, *4398*, *4415*; San German, Dec. 12, *5838*.

This species has not been reported outside of Porto Rico, except one collection from Guatemala, but was found on a phanerogamic specimen at the New York Botanical Garden, on *M. guadalupensis* from Buenaventura, Cuba, collected by Percy Wilson, Dec. 13, 1910, *9237*. The type collection on *C. racemosa* was obtained by A. A. Heller, on the Adjuntas road eight miles from Ponce, Dec. 4, 1902. The species has been placed in the genus *Nigredo* without knowledge of pycnia or aecia, but on the assumption that they occur whenever favorable conditions permit the life cycle to be completed.

32. UROMYCES GEMMATUS Berk. & Curt.; Berkeley, Jour. Linn. Soc. **10**: 357. 1869.

ON CONVOLVULACEAE:

*Jacquemontia nodiflora* (Desv.) G. Don (*Convolvulus nodiflorus* Desv.), Coamo Springs, Jan. 4, O, I, III, *42*, Feb. 1, O, II, III, "*y*," Jan. 1, O, II, *128*, April 6, II, III, *818c*; Desecheo, May 31, II, III, *1586*; San German, Dec. 8, II, III, *5765*, Dec. 12, II, III, *5859*; Dec. 18, II, III, *4121*; Guanica, Dec. 29, II, III, *6827c*; Guayanilla, Nov. 13, II, *5928*.

The only other specimens of this exclusively West Indian rust known to the writer are one made by A. E. Ricksecker on St. Croix in 1896, listed in Millspaugh's Flora of St. Croix (Field Mus.; Bot. Ser., **1**: 466. 1902), as *Puccinia Convolvuli*, one made by E. W. D. Holway at Ponce, P. R., Jan., 1911, and one

made by Holway at Kingston, Jamaica, Feb., 1915, *223*, all three showing uredinia and telia.

A specimen collected by Charles Wright in "Cuba orientali, 1856–7," which is in the Curtis set at Harvard University, is labeled "*Uredo gemmata* B. & C., var." Through the kindness of Dr. W. G. Farlow I have been able to study this collection and believe it to be identical with the material on which *Uromyces gemmatus* B. & C. was founded, which was stated to be "on the underside of leaves of *Convolvulus* etc." With the aid of Mr. Percy Wilson of the New York Botanical Garden the host has been determined with certainty as *Jacquemontia nodiflora*. The fungus consists of uredinia only, and agrees exactly with the description given by Sydow (Ann. Myc. **6**: 138. 1908), said to have been taken from a part of the type material, and also with the uredinia in the fine set of specimens collected by Dr. Stevens. A full description is given to aid in making the species better known.

Pycnia epiphyllous, few in small groups on somewhat discolored spots, inconspicuous, subepidermal, globoid-flask-shaped, 65–135 μ broad by 96–170 μ high; ostiolar filaments 25–30 μ long.

Aecia uredinoid (primary uredo), chiefly hypophyllous, circinate about the area occupied by pycnia, round or oblong, often confluent, otherwise like the uredinia.

Uredinia hypophyllous, scattered or sometimes grouped, round, about 0.5 mm. across, soon naked, cinnamon-brown, somewhat pulverulent, ruptured epidermis noticeable; urediniospores ellipsoid or obovoid, 24–27 by 31–35 μ; wall cinnamon-brown, moderately thick, 2–3 μ, prominently echinulate, the pores about 6, scattered.

Telia hypophyllous, similar to the uredinia but somewhat darker in color, often arising in the same sori; teliospores ellipsoid or obovoid, 23–29 by 32–43 μ, rounded above, somewhat narrowed below; wall cinnamon-brown, thin at sides, 1 μ, greatly thickened above, 7–20 μ, smooth; pedicel nearly or quite colorless, thin-walled, one half to once length of spore.

The *Uredo Jacquemontiae* P. Henn. from New Guinea is described as having considerably larger spores, with wall 5–7 μ thick, echinulate with hyaline points 1 μ long, and is clearly distinct from the West Indian form.

33. UROMYCES COLUMBIANUS Mayor, Mem. Soc. Neuch. Sci. Nat. **5**: 467. 1913.

ON CARDUACEAE:

*Melanthera canescens* (Kuntze) O. E. Schultz, Ciales, June 12, 1912, *28*; Añasco, Jan. 28, *234*, *274*, Oct. 12, *3564*, *3568*; Corozal, Feb. 12, *421*; Yauco, Oct. 3, *3138*; Mayagüez, April 12, *1022*; Vega Baja, May 18, *2041*, *2045*, May 21, *1895*, *1910*, *1922*; Cayey, June 5, *2175*; Cabo Rojo, June 15, *2255*; Rosario, Oct. 27, *3837*; Utuado, Nov. 8, *4423*, *4684*; Quebradillas, Nov. 22, *5190*; San German, Dec. 12, *5831*, *5834*; Guayanilla, Nov. 13, *5917*, *5918*; River junction below Utuado, Dec. 16, *6039*, Dec. 17, *6070*, Dec. 30, *6860*, *6864*; Jayuya, Dec. 17, *6044*, *6045*.

The rust was obtained on the phanerogamic collection of the same host species made by Mr. & Mrs. A. A. Heller *138*, near Rio Piedras, P. R., May 13, 1899.

Since the work on Steven's Porto Rican rusts began, the excellent and detailed study of the rusts of the United States of Colombia by Dr. Eug. Mayor of Neuchatel, Switzerland, has been issued. In this work is a full description of the aecia, uredinia and telia, with a fairly good cut illustrating the urediniospores and teliospores of this species. The type is on *Melanthera aspera* (Jacq.) Steud., Andes centrales, dép. Antioquia, Medellin and Envigado, alt. 1550 m., II and III, August 19, no. *256*, supplemented by a number of other collections.

Pycnia occur in the Stevens collection on nos. *28*, *1910*, *1922*, *2045*, *2175* and *5917* accompanying the aecia, and probably on a number of others. In each case the collection also shows uredinia and telia. The pycnia are subepidermal, globoid or flask-shaped, inconspicuous, about 100 $\mu$ in diameter.

The rust bears the usual characters that entitle it to a place in the genus *Nigredo*, in which it becomes **Nigredo columbiana** (Mayor) comb. nov.

The host belongs to a group of forms that is difficult of separation into species. The Stevens collections are fortunately well supplied with inflorescence at various stages of maturity. Some

of the material resembles *Melanthera deltoides,* and some *M. hastata cubensis,* but the careful study given to the whole set by Mr. Percy Wilson of the New York Botanical Garden, in which he was assisted by other members of the staff, makes it seem best to assign all the Stevens collections to *M. canescens.*

34. UROMYCES BIDENTIS Lagerh. Bull. Soc. France **11**: 213. 1895.

*Uredo Bidentis* P. Henn. Hedwigia **35**: 251. 1896.

*Uredo bidenticola* P. Henn. Hedwigia **37**: 279. 1898.

*Uredo amaniensis* P. Henn. Engler's Bot. Jahrb. **38**: 106. 1905.

ON CARDUACEAE:

*Bidens leucantha* Willd., Santurce, Jan. 22, *269,* June 5, *2176*; Vega Baja, Feb. 20, *470,* May 21, *1731,* Nov. 5, *4280*; Aibonito, June 5, *2146*; Añasco, Oct. 12, *3532*; Mayagüez, Oct. 31, *3952*; Monte Alegrillo, without date, *4713*; Lares, Nov. 22, *4927*; Aguada, Nov. 22, *5093*; River junction below Utuado, Dec. 30, *6583.*

*Cosmos caudatus* H.B.K., Barros, Jan. 2, II, *63*; Jayuya, Dec. 17, II, *5988.*

Most of the Stevens collections show uredinia only. It has been collected in Porto Rico also by E. W. D. Holway, San Juan, January, 1911, showing both uredinia and telia.

Specimens of the species have been seen from Martinique on *B. leucantha,* Hahn, and on *B. pilosa,* Sieber, and from Jamaica on *B. leucantha,* Underwood *1749,* Holway *214,* and on *Cosmos caudatus,* Underwood *1149.*

The type collection is on *Bidens andicola,* near Quito, Equador, Lagerheim, and has not been seen by the writer. A collection on the same host from Guatemala, December, 1887, J. J. Cooper, shows uredinia and telia.

The species is autoecious, and what is often called a hemiuromyces, showing ordinarily only uredinia and telia. However, on collections by E. W. D. Holway, on *B. tereticaulis,* Jalapa, Mexico, *3210* (Barth. N. Am. Ured. *782*), and Oaxaca, Mexico, *3667,* and also by F. L. Stevens, on *B. pilosa,* Caracas, Venezuela,

*3006*, there occur pycnia and uredinoid aecia (primary uredo), which give the following characters:

Pycnia amphigenous, numerous in small groups, honey-yellow becoming darker, subepidermal, globoid, 100–140 $\mu$ in diameter; ostiolar filaments few, 20–30 $\mu$ long; basidiospores large, 5–7 $\mu$ in diameter.

Aecia uredinoid, amphigenous, circinating about the groups of pycnia, resembling the uredinia, but somewhat larger and less pulverulent; aeciospores pedicellate, resembling the urediniospores.

The uredinia and telia are described elsewhere, and especially well, by Sydow, Monog. Ured. 2: 3. 1909. The characters given above entitle the species to be placed in the genus *Klebahnia*, in which it should be **Klebahnia Bidentis** (Lagerh.) nov. comb.

### 35. **Uromyces densus** sp. nov.

Telia hypophyllous, numerous, in small groups on slightly discolored spots, pulvinate, coalescent, all sizes from 0.1 to 1 mm. in diameter, often a central, large, cushion-shaped sorus surrounded by smaller ones, frequently in a circle, dull cinnamon-brown becoming cinereous by germination; teliospores obovoid or oblong, 16–23 by 24–38 $\mu$; wall pale cinnamon-brown, thin, 1–1.5 $\mu$, thicker above, 3–9 $\mu$, smooth; pedicel nearly colorless, delicate, once or twice length of spore.

ON CARDUACEAE:

*Bidens pilosa* L., Ponce, Nov. 8, *4266*.

The same species was collected on *B. leucantha* at La Carmelita, P. R., April 18, 1904, by G. P. Clinton.

The species was also collected on *B. pilosa* at Caracas, Venezuela, July 15, 1913, by Dr. Stevens, *2978*, *2982*, *2998*, *3007*.

All these collections show the same characteristics of dense groups of sori, centrally cinereous from germination of the spores. The appearance is wholly unlike that of *Uromyces Bidentis* with its low, small sori, which do not coalesce and thicken into cushions. The teliospores, however, are essentially alike in the two species. *U. densus* is to be considered a short-cycle form, for which *U. Bidentis* is the corresponding long-cycle form.

*(To be continued)*

# ILLUSTRATIONS AND DESCRIPTIONS OF CUP-FUNGI—II. SEPULTARIA

FRED J. SEAVER

(WITH PLATE 161, CONTAINING 3 FIGURES)

The genus *Sepultaria* was founded by Massee,[1] the name having been first used by Cooke for a subgenus of *Peziza*. The genus was based on *Peziza sepulta* Fries,[2] one of the few species of true hypogaeous cup-fungi.

Previous to the publication of *Peziza sepulta* by Fries, Léveillé[3] described a species with similar characters under the name of *Peziza arenicola*. According to Léveillé, the latter species is peculiar in its mode of development, since the apothecia are at first subglobose and entirely concealed in the ground. After abundant rains they open and then for the first time become visible. The outer surface is covered with long fine hairs which bind the sand to the outside of the apothecia so closely that it is not easily detached.

According to Berkeley and Broome who published Fries's manuscript name of *Peziza sepulta*, this species is closely related to *Peziza arenicola* Lév. and also has a close resemblance to *Hydnocystis* Tul. The plants of the latter genus are said by Tulasne not to open to the surface and in this respect only they differ from those of *Sepultaria*. *Hydnocystis* is commonly placed among the Tuberales.

The writer has examined a specimen of *Peziza arenicola* Lév. from Léveillé and also a specimen of *Peziza sepulta* Fries from Scandinavia and find that the two are identical.

What appears to be the same species has been frequently collected by Professor Ellsworth Bethel in the vicinity of Denver, Colorado. He writes that the fungus is entirely submerged with

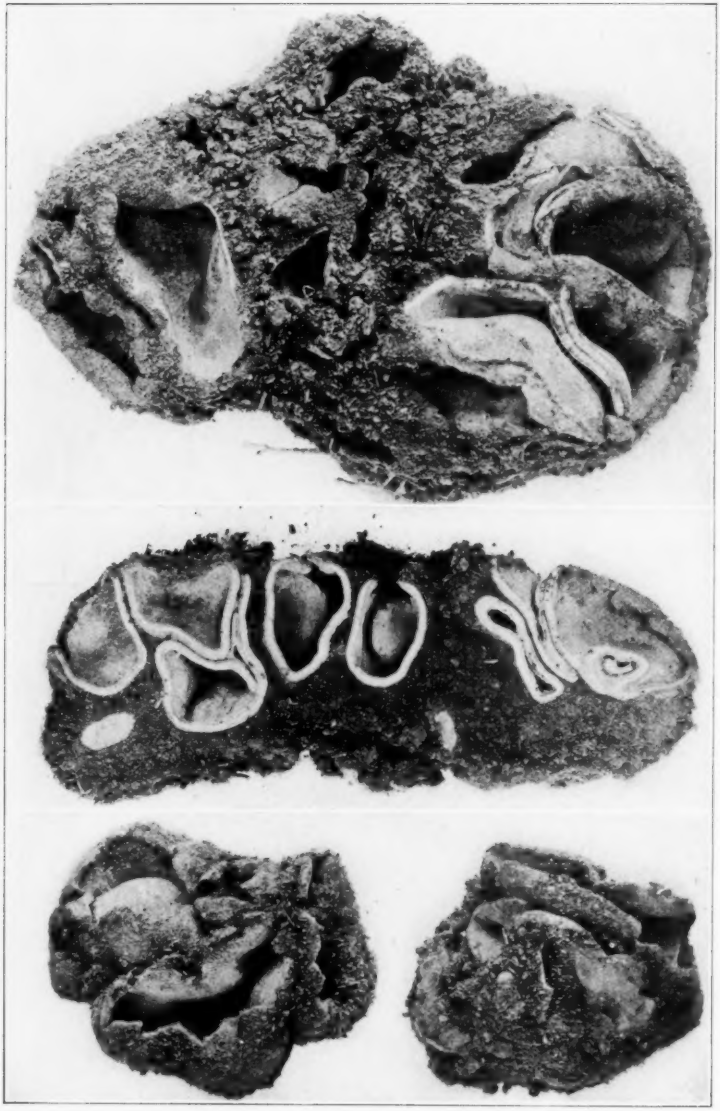
[1] Massee, Brit. Fungus Fl. **4**: 389. 1895.
[2] Ann. Mag. Nat. Hist. II. **13**: 463. 1854.
[3] Ann. Sci. Nat. III. **9**: 140. 1848.

them and is frequently collected by his students who know it as the *"hole in the ground,"* since they find it by looking for holes in the sandy soil. Mr. Ellis was at first inclined to regard the Colorado plants as a new species but finally came to the conclusion that the species was identical with *Peziza sepulta* Fries, according to notes in the Ellis Collection.

The writer has recently received from Mr. W. H. Long in New Mexico fine specimens of a *Sepultaria* which closely resembles the species so frequently collected by Bethel in Colorado. According to the collector, the New Mexican plants do not protrude above ground at all in any of the thirty or forty specimens collected, although the soil is said to be slightly raised when the apothecia break. When mature, small cracks appear in the tops of the apothecia which if the soil is not too firm around them will expand and finally expose some of the hymenium. The New Mexican material was shipped fresh and was received in excellent condition. From some of this material the accompanying photographs were made.

While the New Mexican plants are closely related to *Sepultaria arenicola* (Lév.) Massee, they seem to differ in the form of the spores which are ellipsoid but only slightly longer than broad, while those of the former are often twice as long as broad. Aside from this, the New Mexican plants appear to differ in general habits. Gross characters, however, such as congested habit are taken with considerable allowance since the writer has had no opportunity to make a study of the Colorado plants in a fresh condition and the New Mexican plants are known only from the specimens described here. From the studies which have been made, the New Mexican plants are regarded as distinct.

Specimens which have been referred to *Sepultaria arenicola* (Lév.) Massee, have occasionally been collected in different parts of the east, although the species seems like the one here described to be characteristic of the dry plains of the west. A number of other species have been referred to the genus which are smaller and only partially buried. So far as known, the genus at present contains five species for North America, including the one here described.



SEPULTARIA LONGII SEAVER

The genus should not be confused, as has often been done, with *Sarcosphaera* which differs from *Sepultaria* in the absence of the long brown hairs which are so characteristic of the plants of the latter genus. The two genera agree in that both are hypogaeous. So far as habits are concerned, *Sepultaria* seems to be intermediate between the Pezizales and the Tuberales although with the exception of *Hydnocystis* the fruit characters are not nearly so suggestive of the Tuberales as are those of some other discomycete genera such as *Boudiera* and *Lamprospora*. However that is a question for the morphologist.

**Sepultaria Longii** sp. nov.

Apothecia densely gregarious or cespitose, at first closed and entirely buried, finally opening to the surface by an elongated or compressed aperture, or when the substratum is not too compact spreading so as to expose the hymenium, never protruding above the surface of the substratum but causing the soil to become slightly elevated as they mature, reaching a diameter of 4 cm., regular in form or becoming very much contorted from mutual pressure, externally pale-brown and entirely clothed with long hairs which extend into the substratum, binding the surrounding soil closely to the outside of the apothecium; hairs flexuous, septate, brown, and of nearly uniform thickness throughout their entire length; asci subcylindric above, tapering gradually below into a stem-like base, reaching a length of 250–300 $\mu$ and a diameter of 20–22 $\mu$; spores 1-seriate, short-ellipsoid or subglobose, at first containing one small oil-drop which gradually enlarges until it nearly fills the spore, about 18–20 $\times$ 20–22 $\mu$; paraphyses stout, gradually enlarged above where they reach a diameter of 4–6 $\mu$, filled with numerous vacuoles or oil-drops, hyaline.

On bare ground.

TYPE LOCALITY: Albuquerque, New Mexico.

DISTRIBUTION: Known only from the type locality.

EXPLANATION OF PLATE CLXI

Upper figure, group of apothecia partially concealed by the soil; middle figure, section through the cluster of apothecia showing their hypogaeous habit; lower figure, several apothecia removed from the soil.

# A NEW FUNGUS, PHIALOPHORA VERRUCOSA, PATHOGENIC FOR MAN

E. M. Medlar

The fungus here briefly described was isolated from a chronic skin lesion on the buttock of a man 22 years old. The more detailed description may be found in a current number of the *Journal of Medical Research.*

The fungus grows on all ordinary laboratory media as a brownish-black, felt-like mycelium composed of ramified, septate hyphae which are cylindric, fairly straight, and composed of thick-walled cells $4–25 \times 2–6 \mu$. Their protoplasmic content is finely granular and in it are embedded numerous fat droplets of varying size. By staining, a definite nucleus can be demonstrated in each cell as shown in the accompanying figure.

Sclerotic cells are formed under conditions which are unfavorable to normal growth, and are also produced in tissues and on hydrocele agar. These sclerotic cells may undergo a process of septation in more than one plane and in this way form small sclerotium-like cell-masses.

Reproduction, so far as known, is entirely asexual, and takes place by two types of conidial formation. The type of conidial formation found in cultures where conditions are most favorable for luxuriant growth is semi-endogenous in character. It occurs, as a rule, on specialized, short, lateral branches of the aerial hyphae, although at times the end segment of a hypha may become a conidium bearer. As a rule, these branches consist of a single sporogenous cell, although occasionally they may be composed of two or three cells from which the sporogenous cells may arise terminally and laterally. The sporogenous cells may arise singly or on opposite sides of the same vegetative cell, as indicated in the figure, and are usually ovoid in shape, forming during the process of fructification a shallow, round cup at the distal end. Into this cup the conidia are pushed as a result of the

successive proliferation of the sporogenous cell below. After reaching maturity a septum is formed between the conidium and the parent cell and another conidium is produced. Although these spores are set free as soon as they are formed and are never produced in coherent chains, they are not at once scattered, but remain coherent owing to the presence of a gelatinous material which holds them together. A dozen or more may thus cohere

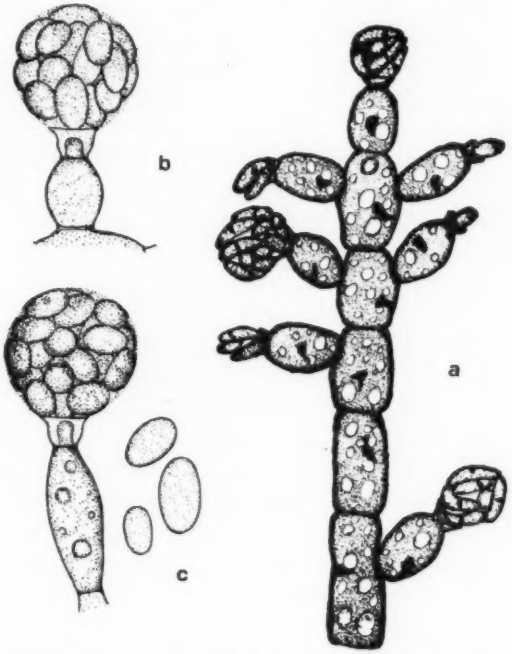



FIG. 1. *Philophora verrucosa* Medlar. *a*, stained specimen showing conidia formation and cellular detail; *b*, *c*, after Thaxter, showing detail of sporogenous cell and conidia.

to the cup-like extremity of the sporogenous cell forming a compact, globose mass. This "cup and ball" habit is very characteristic and the whole bears a close resemblance to a sporangium filled with endogenous spores.

The individual conidium has a definite wall which is at first hyaline or faintly yellowish and becomes brownish with age, a

finely granular protoplasm in which are embedded a few small fat droplets, and a definite nucleus. It varies from 4 $\mu$ to 6 $\mu$ in length and 1 $\mu$ to 3 $\mu$ in breadth.

The second type of conidial formation is found in tissues and in the depths of certain media, such as hydrocele agar. Here the conidia are formed as budding processes from single sclerotic cells, from the individual cells of the sclerotia, and from the end of short terminal and lateral branchlets. They may be single or in chains of two to six. The structure is similar to that of the conidia formed on the aerial hyphae, but the form is distinctly more ovoid.

Because the sexual reproduction, if there is any, of this fungus is unknown it will necessarily have to be classed among the Fungi Imperfecti. The color will place it under the Dematiaceae. So far as can be determined, there has never been described a fungus, either saprophytic, parasitic, or pathogenic for man or other animals, which corresponds closely to this form.

Professor Thaxter has suggested that the fungus should be classed under the sub-division Chalareae of Saccardo's Classification and should be the type species of a new genus, since the successive separation of the conidia and their coherence in a mucous mass which remains adherent to the cup-like apex of the sporogenous cell does not appear to be characteristic of any described genus in this section.

The name *Phialophora* (small shallow cup bearer) is proposed for the genus, and the specific name *verrucosa* is selected, as the lesion clinically resembled verrucous tuberculosis.

The fungus is pathogenic for rats and mice, producing lesions similar to those in man. Its natural habitat is unknown.

The determinative characteristics, as suggested by Professor Thaxter, of the new genus and new species are here given.

**Phialophora** gen. nov.

Mycelium of brown, septate, cylindric hyphae which show a tendency to cohere in rope-like strands, the ultimate branches and branchlets tending to become moniliform. Aerial conidia produced by specialized sporogenous cells which arise terminally or

laterally from the branches: abjointed at maturity, simple, formed through successive proliferation into the cup-like termination of the sporogenous cell to which they cohere in a globose, gelatinous mass. Sclerotic cells and spores in monilia-like chains are also produced in the substratum.

**Phialophora verrucosa** sp. nov.

Sporogenous cells short, ampullae-form or more elongate, usually terminal or irregularly distributed near the ends of the ultimate branchlets, the lips of the terminal cups spreading; spores ovoid to ellipsoid, somewhat variable in form and size, usually about $4–5 \times 2–3\,\mu$; hyphae $2–6\,\mu$ in diameter.

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BOSTON, MASS.

# TESTS ON THE DURABILITY OF GREENHEART

## (NECTANDRA RODIAEI SCHOMB.)

C. J. Humphrey

(With Plate 162, Containing 6 Figures)

Greenheart is a tropical timber-tree,[1] belonging to the laurel family, which has a world-wide reputation for extreme durability. The species grows in South America and some of the West Indian islands and is commercially exploited for home consumption as well as for export trade. In its native home it is used generally where a durable timber is required, it being resistant not only to wood-destroying fungi, but also to marine borers and white ants. Oustide its habitat it finds its greatest use in marine construction, to which it is particularly adapted on account of its resistance to the teredo.

The wood is very hard, heavy (about 61 lbs. to the cubic foot when air dry), tough, very strong, and fine-grained. As in many tropical trees, annual growth rings are not distinguishable.

The proportion of sapwood in a log is usually high, ranging from 3 to 4 inches in thickness in trunks 18 to 24 inches in diameter. Trees under 12 inches usually consist largely of sapwood. It is said that dealers do not regard the sapwood as inferior to heartwood, but the tests below outlined indicate there is a marked difference.

Freshly-cut sapwood is pale-yellow, darkening on exposure; the heartwood may vary from pale-yellow to black. Under the microscope the wood appears very dense, being interspersed with numerous single or double vessels, whose cavities are frequently stuffed with cellular ingrowths, called tyloses (Plate 162, figs. 4, 5, 6). These tyloses, when very abundant, are said to give a darker appearance to the wood.

[1] Mell, C. D., and Brush, W. D. Greenheart. U. S. Forest Serv. Circ. 211. 1913.

The great durability of the wood has been mainly attributed to two factors, (1) the presence of the tyloses, which stuff the vessels and thus render them more difficult of penetration by fungus mycelium, and (2) the presence in the wood of certain alkaloids which may exert a preservative effect.

At least four alkaloids have been extracted from the wood and bark, among which may be mentioned bebeerine[2] (or biberine) of the formula $C_{18}H_{21}O_3N$, and nectandrine, $C_{20}H_{23}O_4N$. The former is said to be commercially exploited as a substitute for cinchona. It contains a methoxyl group, a phenolic hydroxyl group and a $NCH_3$ group.

The toxicity to fungi of these alkaloidal extracts from greenheart has not yet been determined by the writer, but it is the plan to make such tests later, in an effort to throw further light on the durability of this remarkable wood.

During 1913–14 the writer conducted a series of durability tests on both the heartwood and sapwood of greenheart timber. The material was sent to the Forest Products Laboratory, Madison, Wisconsin, from British Guiana for test purposes. The shipment consisted of a 13 by 13 inch square-hewn timber, upon which the bark was still adhering to the corners in strips an inch to an inch and a half wide. The sapwood was about two and a half inches thick, being largely confined to the corners, it being hewn away at the center of the faces.

Test blocks 5/8 by 5/8 by 2 inches long were sawed out from near the center to secure good heart material, while the sapwood specimens were cut from near the circumference at the corners, in many instances representing the extreme outer surface, and hence less than normal size on account of the wane (Plate 162, fig. 2).

Each block was tested singly in a large test tube 1¾ inches in diameter and 9 inches long, the sapwood and heartwood being tested against the same organisms. Seventy tube cultures were originally planned, using 35 species of wood-destroying fungi common to the United States, but certain failures incident to the experiment reduced this number somewhat.

[2] Henry, T. A. The plant alkaloids, pp. 414, 415. 1913.

The test blocks were oven-dried at 100 to 105° C. for 20 hours and weighed. To moisten again they were placed in a dish of tap water, brought to a boil, and allowed to cool.

The tube cultures were prepared by placing a layer of wet sterilized sphagnum moss in the bottom, followed by a layer of moist sterile sand up to about two-fifths the length of the tube. The test block was embedded in this sand for about one-half its length and surrounded by culture blocks of spruce or beech, the former being used in the case of fungi known to inhabit coniferous timber and the latter in the case of hardwood fungi. Over the whole was packed a layer of wet sphagnum. Tap water was then added to saturate the sphagnum and sand in the bottom and the tubes were then tightly plugged with absorbent cotton.

After sterilization of about 1 hour at 12 pounds steam pressure, the tubes were allowed to cool and were inoculated on August 28 and 29 with various wood-destroying fungi, among which are included many of the most active ones prevalent in the United States.

With the exception of *Merulius lachrymans,* which was placed in the incubator at 22 to 26° C., all the cultures were held at laboratory temperature, which varied considerably with the seasons. After one year the tubes were opened and the blocks examined. Plate 162, figs. 1 and 3, illustrate the method of test and the luxuriant mycelial development which was attained by the end of the test period.

Upon removal, the test blocks were oven-dried and re-weighed. Tables I and II present the essential data and results.

An examination of Table I shows that the heartwood of greenheart proved highly resistant, and in most cases practically immune, to all the fungi used, in spite of the fact that the organisms developed luxuriantly in the tubes. Very little effect on the wood was noted in a visual examination. Losses in weight under 0.5 per cent. are not recorded, as this may lie within the experimental error.

Table II shows a somewhat different state of affairs, for the

TABLE I

DURABILITY OF HEARTWOOD

| Organism. | Oven Dry Weight (Grams). | | Loss in Weight (%). | Growth of Organism. | Condition of Culture Blocks. | Condition of Greenheart Test Blocks |
|---|---|---|---|---|---|---|
| | Before Test. | After 1 Year. | | | | |
| *Lenzites betulina* (L.) Fr. No. 629 | 15.89 | 15.72 | 1.1 | Good. | Considerably rotted. | Not appreciably affected. |
| *Lenzites sepiaria* (Wulf.) Fr. No. 780 | 15.72 | 15.12 | 3.8 | Luxuriant. | Thoroughly rotted. | Slightly softened at lower end. |
| *Merulius lachrymans* (Wulf.) Fr.* Germany. | 15.95 | 15.50 | 2.8 | do. | Considerably rotted. | do. |
| *Merulius tremellosus* (Schrad.) Fr. No. 127 | 17.09 | 16.85 | 1.4 | do. | Thoroughly rotted. | Not appreciably affected. |
| *Fomes annosus* (Fr.) Cke. Pa. | 16.37 | 16.35 | ..... | Poor. | Considerably rotted. | do. |
| *Fomes everhartii* (Ell. & Gall.) Wis. | 16.30 | 16.25 | ..... | Luxuriant. | do. | do. |
| *Fomes fomentarius* (L.) Fr. Minn. | 16.69 | 15.00 | 6.5 | do. | Thoroughly rotted. | Slightly affected. |
| *Fomes igniarius* (L.) Fr. No. 6254 | 16.79 | 16.75 | ..... | do. | Considerably rotted. | Not appreciably affected. |
| *Fomes lobatus* (Schw.) Ind. | 15.18 | 14.94 | 1.6 | do. | Thoroughly rotted. | do. |
| *Fomes pinicola* (Sw.) Fr. No. 6222 | 16.05 | 15.98 | ..... | do. | do. | Slightly affected in small spot at one end. |
| *Fomes roseus* (A. & S. )Fr. No. 6364 | 16.35 | 16.35 | ..... | do. | do. | Not appreciably affected. |
| *Polyporus adustus* (Willd.) Fr. No. 626 | 16.87 | 16.90 | ..... | do. | do. | do. |
| *Polyporus obtusus* Berk. Minn. | 15.03 | 14.90 | 0.8 | do. | Considerably rotted. | do. |
| *Polyporus resinosus* (Schrad.) Fr. No. 1043 | 16.54 | 16.50 | ..... | do. | do. | do. |
| *Polyporus sulphureus* (Bull.) Fr. No. 6263 | 15.76 | 15.70 | ..... | do. | Thoroughly rotted. | do. |
| *Polystictus hirsutus* Fr. No. 6390 | 16.85 | 16.85 | ..... | do. | do. | do. |
| *Polystictus versicolor* (L.) Fr.† No. 639 | 15.13 | 15.00 | 0.9 | do. | Considerably rotted. | do. |
| *Trametes robiniophila* Murr. No. 827 | 13.48 | 13.32 | 1.2 | do. | Thoroughly rotted. | do. |
| *Stereum fasciatum* Schw. No. 627 | 16.39 | 16.32 | ..... | do. | do. | do. |
| *Stereum gausapatum* Fr. No. 914 | 16.48 | 16.48 | ..... | do. | Considerably rotted. | do. |
| *Stereum rameale* Schw. No. 954 | 16.70 | 16.70 | ..... | do. | do. | do. |
| *Flammula polychroa* Berk. No. 888 | 16.18 | 16.15 | ..... | do. | do. | do. |
| *Lentinus lecomtei* Fr. No. 945 | 16.27 | 16.10 | 1.0 | do. | Thoroughly rotted. | do. |
| *Lentinus lepideus* Fr. No. 6258 | 17.16 | 17.12 | ..... | do. | do. | do. |

* Held in incubator at 22–26° C.

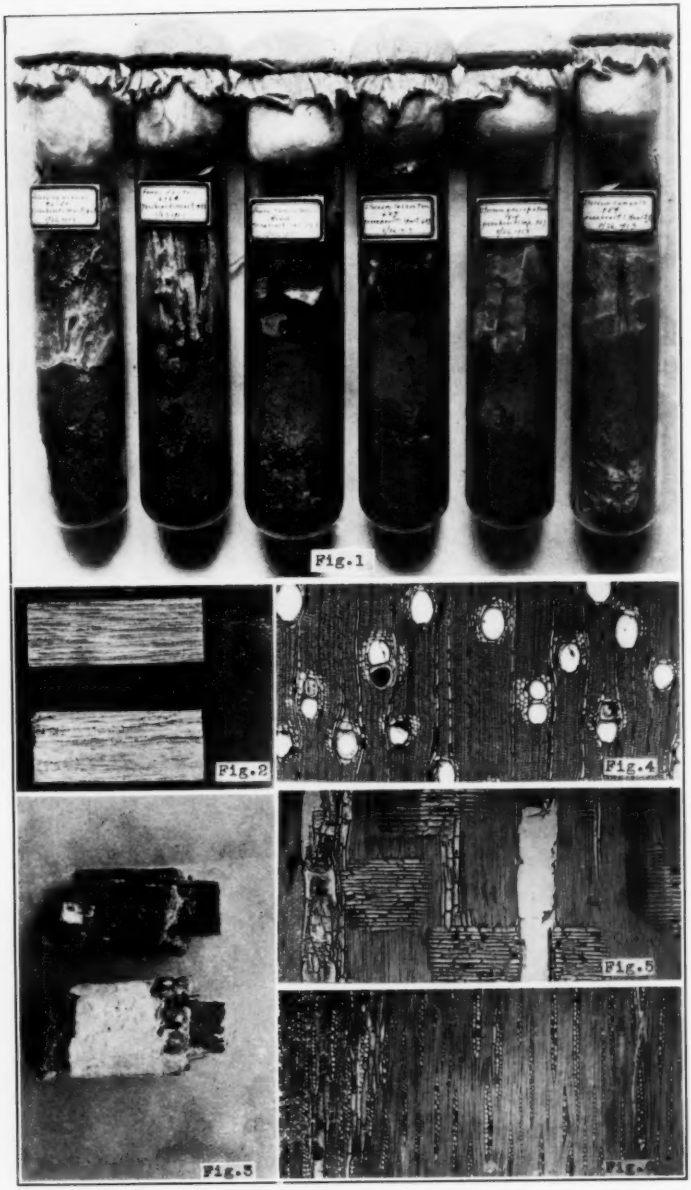
† Hole in bottom of tube allowed culture to dry out.

TABLE II

DURABILITY OF SAPWOOD

| Organism. | Oven Dry Weight (Grams). Before Test. | Oven Dry Weight (Grams). After 1 Year. | Loss in Weight (%). | Growth of Organism. | Condition of Culture Blocks. | Condition of Greenheart Test Blocks |
|---|---|---|---|---|---|---|
| *Lenzites betulina* (L.) Fr. No. 629..... | 8.79 | 8.40 | 4.4 | Luxuriant. | Thoroughly rotted. | Slightly affected. |
| *Lenzites sepiaria* (Wulf.) Fr. No. 780.... | 10.80 | 6.80 | 37.0 | do. | do. | Seriously rotted. |
| *Merulius lachrymans* (Wulf.) Fr.* Germany. | 11.22 | 8.30 | 26.0 | do. | Seriously rotted. | Seriously rotted at lower end. |
| *Merulius tremellosus* (Schrad.) Fr. No. 127 | 9.52 | 8.43 | 11.4 | do. | Thoroughly rotted. | Considerably rotted at both ends. |
| *Fomes annosus* (Fr.) Cke.....Pa. | 14.65 | 14.45 | 1.4 | Poor. | Considerably rotted. | Not appreciably affected. |
| *Fomes everhartii* (Ell. & Gall.) .....Wis. | 14.18 | 13.60 | 4.1 | Luxuriant. | Thoroughly rotted. | Bleached and somewhat affected. |
| *Fomes igniarius* (L.) Fr. No. 6254..... | 14.40 | 11.32 | 21.4 | do. | do. | Considerably affected at lower end. |
| *Fomes lobatus* (Schw.).....Ind. | 12.93 | 9.80 | 24.2 | do. | do. | Considerably affected. |
| *Fomes pinicola* (Sw.) Fr. No. 6222..... | 8.35 | 8.27 | 1.0 | do. | do. | Not appreciably affected. |
| *Fomes robiniae* (Murr.) No. 859..... | 13.72 | 13.67 | ..... | Good. | Considerably rotted. | do. |
| *Fomes roseus* (A. & S.) Fr. No. 6364.... | 14.65 | 14.45 | 1.4 | do. | do. | do. |
| *Polyporus obtusus* Berk.....Minn. | 15.28 | 13.90 | 9.0 | Luxuriant. | do. | Considerably affected at ends. |
| *Polyporus resinosus* (Schrad.) Fr. No. 1043 | 12.60 | 11.49 | 8.8 | do. | Thoroughly rotted. | Considerably affected. |
| *Polyporus sulphureus* (Bull.) Fr. No. 6263 | 8.50 | 7.92 | 6.8 | do. | do. | Considerably affected at lower end. |
| *Polystictus hirsutus* Fr. No. 6390..... | 12.60 | 11.55 | 8.3 | do. | do. | Slightly affected at lower end. |
| *Polystictus prolificans* (Fr.).....Wis. | 10.71 | 10.17 | 5.0 | do. | do. | Considerably affected at lower end. |
| *Polystictus versicolor* (L.) Fr. No. 639.... | 12.87 | 11.47 | 10.9 | do. | do. | Considerably affected. |
| *Stereum fasciatum* Schw. No. 627..... | 13.65 | 13.55 | 0.7 | do. | do. | Not appreciably affected. |
| *Stereum gausapatum* Fr. No. 914..... | 14.10 | 13.05 | 7.4 | Good. | do. | Slightly affected. |
| *Stereum rameale* Schw. No. 954..... | 14.80 | 13.32 | 10.0 | Luxuriant. | Considerably rotted. | Considerably affected at one end. |
| *Flammula polychroa* Berk. No. 888..... | 11.17 | 11.10 | 0.6 | do. | do. | Slightly affected at ends. |
| *Lentinus lecomtei* Fr. No. 945..... | 13.03 | 10.75 | 17.5 | do. | do. | Considerably affected. |
| *Schizophyllum commune* Fr. No. 885.... | 13.24 | 13.07 | 1.3 | Poor. | Slightly affected. | Not appreciably affected. |

* Held in incubator at 22–26° C.




DURABILITY OF GREENHEART

sapwood proved far less resistant. *Lenzites sepiaria* proved the most active organism, producing a loss in dry weight of 37 per cent. *Merulius lachrymans* stands next with a loss of 26 per cent. Six other fungi produced losses ranging from 10 to 25 per cent. The wood remained practically immune to only three of the twenty-three fungi used.

The fact that the sapwood is more susceptible to decay than the heartwood meets our natural expectations, as this is the rule with timbers in which the heart and sapwood are differentiated.

The point to be kept in mind is that the sapwood, being so much less resistant to decay than the heart, should be carefully considered in timber specifications which call for the best quality of durable material. Not alone is the sapwood moderately susceptible to the attacks of fungi, but it is also reported to be more readily attacked by marine borers, and hence is said to be less valuable for wharf construction.

OFFICE OF INVESTIGATIONS IN FOREST PATHOLOGY,
BUREAU OF PLANT INDUSTRY,
MADISON, WISCONSIN.

## DESCRIPTION OF PLATE CLXII

FIG. 1. Cultures in large tubes of six species of fungi, showing method of testing. Each tube contains a greenheart block surrounded by easily rotted culture blocks. After 1 year.

FIG. 2. Greenheart test blocks, heartwood above; sapwood, with wane, below.

FIG. 3. Greenheart block and beech culture blocks matted together by a heavy growth of mycelium at end of the test period. *Stereum fasciatum* above, *Polystictus hirsutus* below.

FIG. 4. Photomicrograph of transverse section of greenheart wood. Note the compact structure and tyloses partially filling the ducts. (By courtesy U. S. Forest Service.)

FIG. 5. Radial section of greenheart wood. (Courtesy of U. S. Forest Service.)

FIG. 6. Tangential section of same. (Courtesy U. S. Forest Service.)

# OBSERVATIONS ON HERPOTRICHIA NIGRA AND ASSOCIATED SPECIES

FRED J. SEAVER

Several years ago while attempting to work out the identity of *Herpotrichia nigra* Hartig and *Neopeckia Coulteri* (Peck) Sacc., the writer was surprised to find the ascospores of a third species on *Picea* which was at first thought to be an undescribed species of *Herpotrichia*. The spores of this species were fusiform, long and narrower than those of *Herpotrichia nigra* and, while usually 5-septate, were often 6-septate and occasionally even 7-septate, while those of *Herpotrichia* nigra were broad, blunt and never more than 3-septate so far as observed.

This strange species was first detected while studying Ellis & Everhart's Fungi Columbiani *1737*, a specimen of *Herpotrichia nigra* which was erroneously distributed under the name of *Lasiosphaeria Coulteri*. The spores of this species were again observed while examining a specimen of *Herpotrichia nigra* on *Picea Engelmanni* sent from Colorado by Bethel, July 7, 1914.

After a careful study it was found that these fusiform spores were not the spores of a *Herpotrichia* as at first suspected but were those of a *Mytilidion* which has been repeatedly found on conifers associated with *Herpotrichia nigra*. The genus *Mytilidion* belongs to the Hysteriales and the perithecia of the plants of this genus are laterally compressed and closely resemble a miniature clam or other bivalve, opening by a slit across the top of the perithecium and very different from the subglobose perithecia of *Herpotrichia*. The perithecia of the *Mytilidion* are, however, so intimately associated with those of the *Herpotrichia* that their real characters may be easily overlooked and when removed together, the spores of the *Mytilidion* may be mistaken for the mature spores of the *Herpotrichia*. If, however, the perithecia are removed and studied individually, it will be found that the fusiform spores are always obtained from the hysteriform perithecia while the subglobose perithecia contain the 3-septate spores which are characteristic of *Herpotrichia nigra*.

The *Mytilidion* is closely related to, if not identical with *Mytilidion fusisporum* (Cooke) Sacc., a species which has been reported on branches and bark of spruces and firs. Cooke's species is said to have spores 50 $\mu$ long, while the spores of our species have never been found to exceed 40 $\mu$ and are often not more than 30 $\mu$. Having seen no authentic specimen of Cooke's species, it is impossible to know how much importance to attach to this apparent difference in the size of the spores. Our specimens have been doubtfully referred to that species.

The recent appearance of the description of a new species of *Herpotrichia* by Weir in the *Journal of Agricultural Research* has attracted the attention of the writer since the spores of his species were practically identical in size and form with those of the *Mytilidion* which has been so frequently found associated with *Herpotrichia nigra*. From the facts in hand the writer is inclined to believe that Weir's supposed new species is based on the combined characters of two different plants, the mycelial and perithecial characters being those of the well-known *Herpotrichia nigra* while the ascus and spore characters are those of the *Mytilidion*.

This suspicion has been strengthened by recent studies of our collections of *Herpotrichia nigra* which shows practically every specimen examined to be accompanied by the *Mytilidion*, the abundance of the latter species varying considerably in different specimens. To add to the difficulty the perithecia of the *Mytilidion* are often overrun by the mycelium of the *Herpotrichia* so that the perithecial characters are obscured. Not only has the *Mytilidion* been found on spruce needles associated with *Herpotrichia*, but it has also been found on pine needles associated in the same way with *Neopeckia Coulteri*.

Weir's drawings illustrate very well the spore characters of the three species, *Neopeckia Coulteri*, *Herpotrichia nigra* and the unnamed species of *Mytilidion* except that the spores of the last are not always 5-septate as indicated in his drawings but are often 6-septate and occasionally even 7-septate. The spore measurements are usually within the limits given by Weir, but spores are occasionally found as long as 38–40 $\mu$. The color is pale-brown, as indicated by him.

NEW YORK BOTANICAL GARDEN.

## NEWS AND NOTES

Professor George Massee, one of the associate editors of *Mycologia*, is reported to have retired from his position as head of the cryptogamic department in the herbarium of the Royal Gardens, Kew, England.

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Dr. H. M. Fitzpatrick, assistant professor of plant pathology at Cornell University, visited the Garden several times recently to examine the collections. Dr. Fitzpatrick is spending three months at the Brooklyn Botanic Garden.

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A large number of specimens of *Agaricus Rodmani* were found on May 19, 1915, by Mr. F. J. McCarthy in a partially shaded street border in Bedford Park, New York City, where this interesting double-ringed species was observed over ten years ago.

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Mr. L. O. Overholts, who recently held a fellowship at the Missouri Botanical Garden, has been appointed instructor in botany at Pennsylvania State College. He enters upon his new duties on August 1.

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Dr. F. D. Fromme, of Purdue University, formerly a student at the Garden, has accepted the position of plant pathologist and bacteriologist at the Agricultural Experiment Station, Blacksburg, Virginia.

---

Dr. H. S. Reed, until recently professor of plant pathology and bacteriology in the Virginia Polytechnic Institute, has been appointed professor of plant physiology in the Citrus Experiment Station and Graduate School of Tropical Agriculture, recently established by the University of California at Riverside.

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Professor Edward M. Gilbert, of the University of Wisconsin, spent about a week at the Garden early in June studying the herbarium collection of tremellaceous fungi. He is planning to

devote considerable attention to this interesting, although somewhat neglected, group of basidiomycetes.

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Dr. B. O. Dodge will spend six weeks during the summer at Camp Columbia, near Litchfield, Conn., where he will offer a course in general botany with special reference to the fungous diseases of forest trees. Some time will also be devoted to the collection and study of fleshy fungi. The work will be offered in connection with the Extension Teaching of Columbia University.

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The March number of *The New Phytologist* contains an article by George K. Sutherland on marine fungi, a field of mycology which has been very poorly explored. The author of the paper restricts his investigations to those fungi which occur on *Pelvetia*. Four species of ascomycetes are recorded for this host, all of which are described as new. The number of species which occur on this host would suggest the possibility that marine fungi may be much more numerous than has previously been supposed.

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In a recent number of the *Journal of Agricultural Research*, J. R. Weir records certain observations on *Rhizina inflata*. These observations tend to support the theory that this fungus is parasitic on coniferous seedlings. The roots of the dying seedlings were found to be covered with a mass of white mycelium which was found to be connected with the fruiting bodies of *Rhizina inflata*. One experiment was conducted which adds some experimental proof in support of the theory, although the experimental work is not extensive enough to be conclusive. The species has frequently been reported as a parasite in Europe.

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The report of the state botanist of New York for 1913, prepared by Dr. Homer D. House, appeared early in June, 1915, as Bulletin 176 of the New York State Museum. It records the moving of the collections to the new building and their arrangement in the new metal herbarium cases in a way to make them more available for study and safer from insect attack. Three

new species of fungi are described, namely, *Inocybe euthelella* Peck, *Clitocybe phyllophiloides* Peck, and *Hebeloma palustre* Peck. Dr. House has contributed some very interesting notes on state local floras and an important article of over thirty pages with copious illustrations on certain features of German forestry.

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In a recent professional paper on the pathology of the jack pine, James R. Weir states that the most important fungous disease of this tree is *Peridermium cerebrum,* the control of which in many localities is quite a serious forest problem. The most important wood-destroying fungi of the jack pine are *Trametes Pini* and *Polyporus Schweinitzii,* but these do not produce any appreciable decay until the tree reaches its period of decline, placed approximately at from sixty to eighty years of age. The wood of this tree deteriorates rapidly after it is cut under the influence of a number of saprophytic fungi and cannot be expected to remain sound in the forest for more than two or three years.

---

Dr. W. A. Murrill, Assistant Director, visited Washington, D. C., and Richmond, Va., early in June and found the chestnut canker abundant in the Washington parks and rapidly spreading south of the Potomac River. Most fleshy fungi were just beginning to appear in Virginia, having been delayed by the cool weather. *Pholiota praecox* and *Lentinus umbilicatus,* however, as well as *Polyporus arcularius,* were already abundant. Probably the most interesting species collected was *Bolbitius variicolor,* so well described and figured in Atkinson's "Studies of American Fungi." This was found in a shaded, manured yard in Falls Church, Virginia, on June 6. The pileus was olivaceous with yellowish center, reticulate-rugose, and very viscid; the lamellae at first straw-yellow or sulfur-yellow; the stipe pale-yellow above and white below, decorated with minute scales pointing upward.

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## RECENT SPECIFIC NAMES RECOMBINED

For the convenience of those using Saccardo's nomenclature, the names of species of boletes and polypores published in *My-*

*cologia* and in "Western Polypores" and "Tropical Polypores" in 1915 are recombined as follows:

| | |
|---|---|
| ELFVINGIA BROWNII | = **Fomes Brownii** |
| INONOTUS LEEI | = **Polyporus Leei** |
| INONOTUS PORRECTUS | = **Polyporus porrectus** |
| PYROPOLYPORUS ABRAMSIANUS | = **Fomes Abramsianus** |
| ROSTKOVITES CALIFORNICUS | = **Boletus californicus** |
| TYROMYCES GRAMINICOLA | = **Polyporus graminicola** |

W. A. MURRILL.

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"Tropical Polypores," a book of 113 pages by W. A. Murrill, was issued June 15, 1915. It contains descriptions of the pileate species occurring in Mexico, Central America, southern Florida, the Bermudas, the West Indies, and other parts of tropical North America, together with descriptive notes and complete keys to the genera and species. *Tyromyces graminicola, Polyporus Marbleae,* and *Inonotus porrectus* are described as new; while *Inonotus leprosus* (Fries), *Fomes turbinatus* (Pat.), *Elfvingiella fasciata* (Sw.), *Fulvifomes calcitratus* (Berk. & Curt.) Murrill, *Fulvifomes Cedrelae* Murrill, *Fulvifomes cinchonensis* Murrill, *Fulvifomes dependens* Murrill, *Fulvifomes extensus* (Lév.) Murrill, *Fulvifomes grenadensis* Murrill, *Fulvifomes hydrophilus* Murrill, *Fulvifomes jamaicensis* Murrill, *Fulvifomes linteus* (Berk. & Curt.) Murrill, *Fulvifomes melleicinctus* Murrill, *Fulvifomes pseudosenex* Murrill, *Fulvifomes sarcitus* (Fries) Murrill, *Fulvifomes sublinteus* Murrill, *Fulvifomes subpectinatus* Murrill, *Fulvifomes Swieteniae* Murrill, *Fulvifomes troyanus* Murrill, *Fulvifomes Underwoodii* Murrill, and *Fulvifomes yucatanensis* Murrill are newly combined. The index to genera with species forms a handy check list and the authorities have been added for the convenience of those wishing to write labels.

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## THE NEW GENUS LENTODIELLUM

This genus was described for Volume 9, part 4, of *North American Flora,* but it had to be reserved for the following part which will not appear for some months.

27. **LENTODIELLUM** Murrill, gen. nov.

Persistent, fleshy-tough, densely cespitose; pileus smooth, deeply depressed; lamellae decurrent: spores hyaline: veil scanty, evanescent: stipe central, hard, woody.

Type species, *Panus concavus* Berk.

1. **Lentodiellum concavum** (Berk.) Murrill

*Panus concavus* Berk. Ann. Mag. Nat. Hist. II. **9**: 194. 1852.
?*Lentinus cochleatus occidentalis* Fries, Nova Acta Soc. Sci. Upsal. III. **1**: 227. 1855.

Pileus tough but fleshy, infundibuliform, densely cespitose, 3–8 cm. broad; surface glabrous but not polished, chalky-white, not striate, margin strongly incurved, appendiculate: lamellae strongly decurrent, crowded, narrow, white becoming yellowish: spores oblong-ellipsoid, pointed at one end, smooth, hyaline, 6–7 × 2.5–3 $\mu$: stipe exannulate, central or nearly so, cylindric, connate below, glabrous or subglabrous, white, solid, tough, 4–8 cm. long, 3–4 mm. thick: veil thick, white, appendiculate.

TYPE LOCALITY: Santo Domingo.

HABITAT: On dead logs and stumps.

DISTRIBUTION: Tropical America.

W. A. MURRILL.

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Dr. Arthur Harmount Graves, formerly assistant professor of botany in the Sheffield Scientific School of Yale University, returned early in July on the S. S. "St. Paul" from Liverpool. He has been spending a year in research at the laboratory of Professor V. H. Blackman, professor of plant physiology and pathology, Imperial Institute of Science and Technology, London. It may be recalled that Dr. Graves was one of a number of professors in the Sheffield Scientific School who were not reappointed in June, 1914, on account of a lack of funds.

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**Kock, G.** Der nordamerikanische Stachelbeermeltass und seine Bekampfung. Obstzüchter 1–4. *f. 1–3.* 8 N 1915.

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